RFP/ER-SAF-94-GMP

FINAL
GROUNDWATER MONITORING PROGRAM
HEALTH AND SAFETY PLAN

Rocky Flats Environmental Technology Site
Golden, Colorado

Revision 1

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ADMIN RECORD
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This "Final Groundwater Monitoring Program Health And Safety Plan (HASP), Rocky Flats Environmental Technology Site," was originally prepared by Golder Associates, Inc and revised in 1997 by Tierra Environmental Consultants, Inc

This Site-specific Health And Safety Plan has been written for Rocky Mountain Remediation Services, L L C (RMRS), its employees and subcontractors Personnel associated with this Project shall comply with all aspects of this Plan

APPROVED BY:

RMRS Project Manager — *Date* 12/18/97

APPROVED BY:

SSOC Radiological Engineer — *Date* 12/21/97

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RMRS Health & Safety Supervisor — *Date* 12/29/97

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1.0 PROJECT IDENTIFICATION

Project Name Groundwater Monitoring Operations

Project Location Rocky Flats Environmental Technology Site
Jefferson County, Colorado

This Health And Safety Plan (HASP) presents health and safety requirements for work performed in the Groundwater Monitoring Program at Rocky Flats Environmental Technology Site All personnel performing work under the Groundwater Monitoring Program, including subcontractors, must abide by the conditions set forth in this HASP Each subcontractor will demonstrate adoption of this HASP by signing the subcontractor approval page at the beginning of this document, incorporating the approval page following the cover page, and providing RMRS with a letter of adoption and listing of individuals fulfilling staff organization positions described in Section 2 0

This HASP complies with applicable sections of 29 CFR 1910 120 and 29 CFR 1926, and is prepared for the Groundwater Monitoring Program Subcontractor Subcontractors will not use this plan for tasks other than those described in Section 4 0, nor will they modify or use this HASP without written approval by the RMRS Project Manager (PM), the RMRS Health and Safety Supervisor (HSO), and the RMRS Radiological Engineer This plan is not valid unless it is signed and dated by RMRS individuals identified above Controlled document signature pages are provided following the HASP cover page Modifications to the HASP shall comply to Procedure 2-E95-ER-ADM-05 05, Procedure 2-E04-ER-ADM-05 07, and the Environment Restoration Health and Safety Program Plan

2.0 STAFF ORGANIZATION

Appendix A, Figure A-1, depicts the Health and Safety Responsibility flow chart, identifying personnel currently in those positions and summarizing their roles with respect to this HASP

Any personnel to be assigned to field activities must be approved by the subcontractor Health and Safety Specialist (HSS) or Health and Safety Officer (HSO) before they begin any Groundwater Monitoring field work

3.0 SITE HISTORY AND NATURE OF CONTAMINATION

3.1 Rocky Flats Plant

3.1.1 Physical Setting

The Rocky Flats Environmental Technology Site (RFETS) is located in northern Jefferson County, Colorado, approximately 16 miles northwest of Denver The cities of Boulder, Broomfield, Westminster, and Arvada are located less than 10 miles to the north, northeast, east, and southeast, respectively RFETS consists of approximately 6,550 acres of federal land and occupies Sections 1 through 4 and 9 through 15 of Township 2 South, Range 70 West, 6th Principal Meridian Major plant buildings are located within a RFETS security area of approximately 400 acres The security area is surrounded by a Buffer Zone of approximately 6,150 acres RFETS is generally bounded on the north by State Highway 128 To the east is Jefferson County Highway 17, also known as Indiana Street, to the south are agricultural and industrial properties, and State Highway 72, and to the west is State Highway 93 A general map of the site is provided in Figure 3-1

3.1.2 Site Background

RFETS is a government-owned and contractor-operated facility that is part of the nationwide nuclear weapons production complex RFETS was operated for the U S Atomic Energy Commission (AEC) from the inception of RFETS in 1951 until the AEC was dissolved in January 1975 At that time, responsibility for RFETS was assigned to the Energy Research and Development Administration (ERDA), which was succeeded by the Department of Energy (DOE) in 1977 Dow Chemical USA, an operating unit of the Dow Chemical Company, was the managing and operating contractor of the facility from 1951 until June 30, 1975 Rockwell International succeeded Dow Chemical USA from July 1, 1975 to January 1, 1990, followed by EG&G Rocky Flats through June 1995, and Kaiser Hill from July 1995 to the present date

3.1.3 Rocky Flats Plant Operations

Until 1992, the primary mission of RFETS was to produce metal components for nuclear weapons These components were fabricated from plutonium, uranium, and nonradioactive metals, principally beryllium and stainless steel Parts made at the plant were shipped elsewhere for final assembly When a nuclear weapon is determined to be obsolete, components of these weapons which had been fabricated at RFETS are returned for special processing which recovers plutonium Other activities at RFETS include research and development in metallurgy, machining, nondestructive testing, coatings, remote engineering, chemistry, and physics

In 1994, the mission of RFETS shifted from a weapons manufacturing facility to environmental restoration facility Emphasis is now focused on identifying and quantifying the extent of the environmental liabilities at the facility Subsequent mitigation of the liabilities will be performed

3.1.4 Previous Investigations

Various studies have been conducted at RFETS to characterize environmental media and to assess the extent of radiological and chemical contaminant releases to the environment These have included geological studies, surface water and groundwater studies, and geophysical and radiometric surveys Several environmental, ecological, and public health studies culminated in the Final Sitewide Environmental Impact Statement (DOE 1980)

In 1986, two major environmental investigations were completed at RFETS The first was the Comprehensive Environmental Assessment and Response Program (CEARP) Installation Assessment (DOE 1986a), which included analyses and identification of current operational activities, active and inactive waste sites, current and past waste management practices, and potential environmental pathways through which contaminants could be transported A number of sites that could potentially have adverse impacts on the environment were identified These sites were divided into three categories

- Hazardous waste management units that will continue to operate and need a Resource Conservation and Recovery Act (RCRA) Part A operating permit,
- Hazardous waste management units that will be closed under RCRA interim status, and,
- Inactive waste management units that will be investigated and cleaned up under Section 3004 (u) of RCRA or under CERCLA

The second major environmental investigation completed at RFETS in 1986 involved a hydrogeologic and hydrochemical characterization of the entire RFETS site Results of these investigations were reported by Rockwell International in 1986 Investigation results indicated four areas to be significant contributors to environmental contamination, with each area containing several sites Those areas are commonly referred to as the 881 Hillside Area, the 903 Pad Area, the Mound Area, and the East Trenches Area

3.1.5 Groundwater Monitoring Program

The Groundwater Monitoring Program at the RFETS currently includes 91 wells The actual number of wells monitored varies according to specific program requirements The program has been designed to protect groundwater, measure the concentrations and rate of transport of hazardous constituents, and to define the extent of any contaminant plumes in the uppermost aquifer within the RFETS boundaries

Groundwater monitoring at the RFETS has been focused on sixteen areas that were once managed as Operable Units (OUs) All but six of these are no longer OUs, and one of the six is a

rearrangement of several previous OUs However, for the purposes of this document and to ease in descriptions of groundwater monitoring activities in the various areas, the OU designations will be used in this HASP

Three Operable Units (OUs) (the Solar Evaporation Ponds [OU4], the Present Landfill [OU7], and the West Spray Field [OU11]) at the RFETS are subject to Interim Status groundwater monitoring requirements under the Resource Conservation and Recovery Act (RCRA) The remainder of the RFETS OUs are sampled to characterize the groundwater during the Remedial Field Investigation (RFI) activities or do not require a specific groundwater monitoring system, but have been included in the RFETS Groundwater Monitoring Program to supply hydrogeologic and analytical data needed to characterize other areas of the RFETS Groundwater monitoring is currently being accomplished within 12 OUs and the Buffer Zone and at RFETS The twelve areas are listed below and discussed in subsequent subsections of the Section

- OU1 881 Hillside,
- OU2 903 Pad, Mound, and East Trenches,
- OU3 Off-Site Releases,
- OU4 Solar Evaporation Ponds,
- OU5 Woman Creek Priority Drainage,
- OU6 Walnut Creek Priority Drainage,
- OU7 Present Landfill and Inactive Hazardous Waste Storage Areas,
- OU9 Original Process Waste Lines,
- OU11 West Spray Field,
- OU12 400/800 Area,
- OU13 100 Area, and,
- OU14 Radioactive Sites

Wells at RFETS are classified into one of six categories, determined by their specific function in the Groundwater Protection and Monitoring Program The locations of each well and piezometer are shown in Figure 3-2 The six types are defined as follows

➢ **Plume Definition Wells** - These are wells that are within known contaminant plumes and are above Tier II action levels, but are below the Tier I levels established in the ALF These wells will be monitored to determine whether concentrations of contaminants are increasing, and, if the 100x action level is exceeded, will prompt reclassification to Tier I and be prioritized for remedial action

➢ **Drainage Wells** - wells currently in the monitoring program that occur in stream drainages downgradient of contaminant plumes If contamination reaches these wells, and standards are exceeded, they fall under the same requirements as Plume Extent wells

➢ **Boundary Monitoring Wells** - wells used to monitor the quality of groundwater leaving the eastern Site boundary

In addition to this general groundwater monitoring scheme, specific requirements are spelled out in support of regulatory directives The following special categories are included as groundwater program elements

➢ **D&D Monitoring Wells** - wells used to monitor releases to groundwater from D&D activities on specific buildings This requirement is specified in the IM/IRA for the Industrial Area (DOE, 1994)

➢ **Performance Monitoring Wells** - wells used to monitor the effect of a remedial treatment or source removal action Performance monitoring of source remediation is specifically required in the RFCA Action level framework for groundwater The French Drain Performance Monitoring Wells are included in this category and are specified in the French Drain IM/IRA Plan (DOE, 1992a)

➢ **RCRA compliance Wells** -Wells identified for use in upgradient/downgradient monitoring of RCRA interim status units This requirement is specified under 6CCR 1007-3 Wells monitored at the new landfill would be specified under 6 CCR 1007-2 Future retrievable storage facilities would also fall under the RCRA monitoring category

3 2 Creation of the Operable Units and Individual Hazardous Substance Sites (IHSSs)

The Draft Installation Assessment under the Comprehensive Environmental Restoration Program (CERP), formerly the Comprehensive Environmental Assessment and Response Program (CEARP) (DOE 1986a), appears to have been the first document to compile a list of potential hazardous waste sites at RFETS The Assessment also attempted to prioritize the sites on the basis of EPA's Hazard Ranking System (HRS) and DOE's Modified HRS scoring High priority sites, such as the 881 Hillside, were recommended for further investigation In response to the recommendation, remedial investigations commenced at the high priority sites The RCRA Part B Permit Application (DOE 1986b, DOE 1986c) for the RFETS was completed in November 1986 for RFETS hazardous waste management units that would continue to operate Appendix 1 of the permit application (DOE 1987), RCRA 3004 (u) Waste Management Units, defined the inactive waste sites as solid waste management units (SWMUs) A plan for investigating the remaining sites, referred to as the low priority sites, was prepared in 1988 This plan identified 103 low priority SWMUs and recommended appropriate additional investigations The plan also presented groups of SWMUs based on their geographical locations, similar contaminants, and applicable pathways The SWMUs were combined into ten Operable Units (OUs) in the Draft Interagency Agreement (IAG) (IAG 1990)

Additional SWMUs were added to the IAG based on the Part B RCRA application and independent reviews of aerial photographs and facility submittals A total of 178 SWMUs were identified The ten OUs were reprioritized and divided into sixteen OUs (Operable Units 1 through 16) in the final IAG (1991) The SWMUs were also renamed Individual Hazardous Substances Sites (IHSSs) in the final IAG The term IHSS is used in the remainder of this Section

3.3 Operable Unit 1 - 881 Hillside

Information on the nature and extent of contamination is taken from the Final Phase III RFI/RI Work Plan, Rocky Flats Environmental Technology Site, 881 Hillside Area Operable Unit No 1 (DOE 1990) Section 2 3 1 of that Work Plan describes how background levels of chemical constituents were calculated Section 2 3 and the Appendixes of that Work Plan present available analytical data

Phase I and Phase II soils investigations indicated tetrachloroethane, trichloroethene, and 1,1,1-trichloroethane contamination in some samples at the 881 Hillside Plutonium and americium were detected above background in soil samples that include the ground surface, however, windblown dust from the 903 Pad (OU2) is the suspected source of these radionuclides Tetrachloroethane and trichloroethene are the principle volatile organic compounds which have been detected in surface water samples in the area Numerous metals and other inorganic compounds have occasionally been above background Gross alpha, gross beta, uranium, and plutonium exceed background in many of the surface water samples

Groundwater is contaminated in both the eastern and western portion of the 881 Hillside The most pronounced organic contamination is in the eastern portion of the Hillside area, with tetrachloroethane, trichloroethene, 1,1-dichloroethene, 1,1-dichloroethane, 1,1,1-trichloroethane, 1,1,2-trichloroethane, and carbon tetrachloride reaching several thousand micrograms per liter in many samples Organic contamination in the western portion of the 881 Hillside area occurs at much lower concentrations Concentrations of metals and inorganic constituents in the eastern portion of the study area include numerous occurrences of nickel, strontium, selenium, zinc, copper, and uranium above background

3.4 Operable Unit 2 - 903 Pad, Mound, and East Trenches

Information on the nature and extent of contamination is taken from the Phase II RFI/RI Work Plans for Alluvial and Bedrock, 903 Pad, Mound, and East Trenches Areas (Operable Unit 2) (DOE 1991a, DOE 1991b) Section 2 3 of the Work Plan describes how background levels of chemical constituents were calculated Section 2 3 and the Appendixes of the Work Plan present available analytical data

Plutonium and americium occur above background in surface soils Other radionuclides and trace metals occur at low concentrations and are infrequently above background but may also be soil contaminants Data suggest plutonium and americium were released to soils in the area via wind dissemination during clean-up efforts at the 903 Drum Storage Site

Based on existing results, carbon tetrachloride, tetrachloroethane, and trichloroethene are the primary volatile organic contaminants found in the upper hydrostratigraphic unit groundwater flow system Trace elements commonly occurring above background in groundwater include strontium, barium, copper, and nickel, and to a lesser extent, chromium, manganese, selenium, lead, zinc, and molybdenum Also, major cations and anions and total dissolved solids are somewhat elevated above background throughout and downgradient of the OU Uranium-238 is the predominant radionuclide occurring above background in the upper groundwater, but a few samples indicate plutonium and americium contamination downgradient of the 903 Pad and possibly north of the Mound

There is considerable interaction between surface water and groundwater As a result, organic contamination is observed in seeps downgradient of the 903 Pad and in the upper reaches of South Walnut Creek at the Mound Area Also, somewhat elevated concentrations of total dissolved solids, major ions, strontium, zinc, and uranium are present at many of the surface water stations Plutonium and americium are also observed in two seeps downgradient of the 903 Pad and in the upper reaches of South Walnut Creek This may be attributed to the water from the seeps coming in contact with surface soils exhibiting elevated concentrations of these radionuclides

3.5 Operable Unit 3 - Off-Site Releases

Information on the nature and extent of contamination is taken from Final RFI/RI Work Plan for Operable Unit 3, Rocky Flats Environmental Technology Site (DOE 1991c)

IHSS 199, Contamination of the Land's Surface, is comprised of 350 acres of land with concentrations of plutonium greater than 0 9 picocuries per gram Hot spots may occur outside the designated acreage, however, it is reasonable to assume that areas outside the designated acreage contain lower concentrations of plutonium than the designated areas Remediation has been implemented on 120 of the 250 acres of contaminated land owned by Jefferson County Tilling of the 120 acres resulted in soil concentrations below the mandated cleanup level Revegetation of this land is in progress Very few data exist for contaminants other than plutonium

Sampling at Great Western Reservoir (IHSS 200) indicates that layers of sediment containing plutonium above background levels are present in the bottom of the reservoir Plutonium exists in discrete sediment horizons (at depths of 17 inches and 7 5 inches) corresponding to historical releases from RFETS The highest concentrations are found in the deepest areas of the reservoir There is no evidence of plutonium migration through the sediment column Concentrations of plutonium and other radionuclides in water at the reservoir are below background levels and/or EPA drinking water standards

Radioactive materials released from RFETS may have been transported to Standley Lake (IHSS 201) through surface water and/or airborne particulates Plutonium has been measured in sediment in the lake The concentrations in the sediment layers exceeded baseline levels beginning in the 1966 layer, peaked in 1969, and declined after 1969 The time period correlates with the known period of windblown plutonium release from the 903 Pad at RFETS Studies of the sediments concluded that plutonium rapidly and almost irreversibly attaches itself to clay sediments In 1974, Battelle conducted an investigation of radionuclide concentrations in reservoirs and streams near RFETS Concentrations of plutonium-239, plutonium-240, and americium-241 in the water at the lake were above the expected atmospheric fallout background, which was not specifically

quantified in the study, but were more than four orders of magnitude below EPA National Primary Drinking Water Regulation of 15 pCi/L for total long-lived alpha activity

Only very limited data have been collected to characterize Mower Reservoir (IHSS 202) RFETS-derived contaminants in the reservoir are believed to have been transported primarily as airborne particulates, and, to a lesser degree, by surface water through the Woman Creek drainage It can be inferred that contaminant concentrations resulting from releases into Woman Creek would be similar for Mower Reservoir and Standley Lake, while concentrations resulting from airborne releases and from erosion and transport of contaminated soils by surface runoff would be similar for Mower Reservoir and Great West Reservoir It is expected that Mower Reservoir received similar amounts of plutonium through airborne transport as the nearby land surface

3.6 Operable Unit 4 - Solar Evaporation Ponds

Information on the nature and extent of contamination is taken from the Draft Final Phase I RFI/RI Work Plan (DOE 1991d) and Environmental Assessment, Dewatering and RCRA Partial Closure Action on Solar Evaporation Ponds, Rocky Flats Environmental Technology Site (DOE 1991e) Section 2 5 of the Work Plan describes the calculation of background concentration and summarizes the chemical data for OU4

Liquids and sludges in the Solar Evaporation Ponds contain detectable levels of the radionuclides plutonium, americium, tritium and uranium Metals of interest in the liquids and sludges include beryllium, cadmium, chromium and nickel Nitrates are also a major constituent of the liquids and sludges Soil samples in the vicinity of the solar ponds contain concentrations of chromium, nickel, nitrate, potassium, sodium, calcium, magnesium, and radionuclides that are likely attributable to the Solar Ponds Low levels of nitrates and radionuclides have been detected in both alluvial and bedrock groundwater Surface water in the form of seeps near the solar ponds contains nitrate, metal and radionuclides

3.7 Operable Unit 5 - Woman Creek Priority Drainage

Information on the nature and extent of contamination is taken from Section 2 0 of the Final Phase I RFI/RI Work Plan, Woman Creek Priority Drainage (Operable Unit No 5) (DOE 1991f)

The Original Landfill (IHSS 115) received numerous materials during its operation Chemicals that may have been placed in the Original Landfill include commonly used solvents, such as trichloroethylene, carbon tetrachloride, tetrachloroethylene, petroleum distillates, 1,1,1-trichloroethane, dichloromethane, benzene, paint and paint thinners Metals such as beryllium, uranium, lead, and chromium may also be present Radiological surveys of the area have indicated the presence of radionuclides, and some soil containing uranium was previously removed from the Original Landfill Metals and radionuclides have been detected in groundwater near the Original Landfill

The nature and extent of contamination at the Ash Pits, Incinerator and Concrete Wash Pad (IHSSs 133 1 through 133 6) are not well known General combustible wastes from RFETS were burned in the incinerator along with as estimated 100 grams of depleted uranium Metals were detected in Ash Pit 3 Metals and radionuclides have been detected in groundwater wells near the Ash Pits

Detention ponds C-1 and C-2 have been regularly sampled in recent years Water in the ponds is known to contain detectable concentrations of metals and radionuclides, but background levels have not been determined for the Woman Creek area Sediment samples also contain measurable metals and radionuclides

3.8 Operable Unit 6 - Walnut Creek Priority Drainage

Information on the nature and extent of contamination is taken from Section 2 0 of the Final Phase I RFI/RI Work Plan, Walnut Creek Priority Drainage (Operable Unit No 6) (DOE 1991g)

Ponds A-1 and A-2 contain radionuclides including plutonium and uranium in both the water and the sediments Pond A-3 is reported to contain elevated uranium-233/234 and uranium-238

concentrations like Pond A-2 Water quality in Pond A-4 is similar to background levels Pond B-1 has moderately elevated uranium-233/234 and uranium-238 concentrations, and plutonium is reported in both the water and the sediments Pond B-2 water contains background levels for the various radionuclides except plutonium Pond B-3 has detectable plutonium as well as zinc and nitrates Ponds B-4 and B-5 have detectable levels of uranium-233/234 and 238 Ground water in the vicinity of the A- and B-series ponds contain several metals and radionuclides above detection limits but these concentrations could represent background levels

No previous studies have been conducted at the four spray fields However, analytical results from water samples collected from the East and West Landfill Ponds provide significant data regarding the North, South and Pond Area Spray Fields (IHSSs 167 1-3) Strontium and tritium were detected in the Landfill Ponds water In addition, minor organics and several metals and radionuclides have been reported in surface water and groundwater samples collected near the spray fields Analytical data from Pond B-3 water provides data regarding the East Area Spray Field (IHSS 216 1) Radionuclides and metals have been detected in the water from Pond B-3

Only one previous soils investigation has reportedly been conducted at Trench A Uranium-233/234 and 238, and several volatile organics were detected in the soils Metals, radionuclides and one volatile organic compound have been detected in groundwater in the vicinity of the trenches No previous studies have been conducted at the Sludge Dispersal Area (IHSS 141) A potential for contamination within the drying beds by a variety of chemicals in the sludge, particularly plutonium, is possible Volatile organics, metals, and radionuclides have been detected in groundwater and surface water samples downgradient of the IHSS

At the Triangle Area (IHSS 165), previous radiometric soil surveys have indicated the presence of radionuclides The contaminated soils were removed on several occasions following the soil surveys Metals, radionuclides and organic compounds have been detected in groundwater near the area

Previous soils investigations at the Old Outfall (IHSS 143) reported elevated levels of plutonium and organics Contaminated soils were removed from the site in 1971 Metals and radionuclides have been detected in surface water samples taken downgradient of the IHSS

No previous investigations have been completed at the Soil Dump Area The soils may contain plutonium

3 9 Operable Unit 7 - Present Landfill and Inactive Hazardous Waste Storage Area

Since little direct characterization of the types of contaminants in the landfill or inactive storage area has been conducted to date, most of what is known is based on waste stream identification studies and groundwater and surface water quality monitoring (DOE 1991h) Previous evaluations of groundwater quality from wells at the periphery of the landfill indicate the landfill contributes calcium, bicarbonate, and, to a lesser extent, sulfate, iron, manganese, zinc, and strontium to the groundwater Volatile contamination, primarily trichloroethylene and 1,1,1-trichloroethane, has been found sporadically and at low concentrations in groundwater in some areas at the landfill periphery Elevated uranium and tritium levels also exist in some areas Soil contamination has not been characterized, but it may be reasonable to assume that the nature of contamination is similar to the groundwater contamination

The primary mechanism for release of contaminants from the Present Landfill into the affected media appears to be by percolation of groundwater (leachate) through the wastes and then out of the landfill Groundwater flow exiting the wastes can potentially distribute contamination vertically downward and laterally downgradient

3.10 Operable Unit 8 - 700 Area

Since previous investigations have not been conducted at these units, the nature and extent of contamination is based on materials stored at the sites and on previous site uses (Rockwell International 1988, DOE 1987, DOE 1992a, DOE 1992b)

Materials stored in the tanks involved in the Multiple Solvent Spills (IHSSs 118 1 and 188 2) included carbon tetrachloride, petroleum distillates, paint thinners, 1,1,1-trichloroethane and methyl ethyl ketone Process wastes, typically containing uranium, solvents, oils, beryllium, nitric acid, hydrochloric acid, and fluoride, were released from Valve Vault 7 (IHSS 123 1) Cooling Tower Blowdown from IHSSs 135, 137, and 138 typically contained algaecides and chromates The 1976 spill from IHSS 138 also contained some radioactivity The 1990 spill from IHSS 138 contained phosphates Materials stored in the tanks involved in the Caustic/Acid Spills (IHSSs 139 1 and 139 2) included hydrochloric, hydrofluoric, nitric and sulfuric acids, and sodium hydroxide and potassium hydroxide Spills of #2 fuel oil were the cause of IHSS 151, Fuel Oil Leak A spill of a mixture of nitric and hydrochloric acid was the cause of the Acid Leak (IHSS 188)

The Sewer Line Break (IHSS 144) involved the release of radioactive laundry wastewater The radioactive Liquid Leaks (IHSS 150 1-8) were primarily releases of liquid process wastes containing radioactive compounds and solutions containing caustics and acids

The Radioactive Sites - 700 Area (IHSS 163 1 and 163 2) and Radioactive Sites - 900 Area (IHSS 173) may have been contaminated with radioactive compounds including americium No radioactivity above background levels has been detected by radiometric surveys of the IHSS 163 locations Radioactivity has been measured at IHSS 173 Radiometric surveys have not detected radioactivity above background levels at the Building 991 Steam Cleaning Area (IHSS 184) The Central Avenue Waste spill (IHSS 172) consisted of less than 100 gallons of plutonium contaminated oils and oils with lathe coolant (hydraulic oil and carbon tetrachloride)

3.11 Operable Unit 9 - Original Process Waste Lines (OPWL)

Information on the nature and extent of contamination is taken from Draft Final Phase I RFI/RI Work Plan, Original Process Waste Lines (Operable Unit No 9) (DOE 1991i)

Low-level radioactive aqueous wastes with high nitrate concentrations were a primary Original Process Waste Lines (OPWL) waste stream Volatile and semivolatile organics were transferred through the OPWL in small quantities Numerous acids were discharged to the OPWL, as well as bases, metals, and small quantities of other liquids, including pickling liquor from foundry

operations, medical decontamination fluids, miscellaneous laboratory wastes, and laundry effluent Releases from the OPWL and associated IHSSs may have occurred as a results of leakage, deterioration of pipes, breakage, and overflows The lateral and vertical extent of releases are not precisely known but are expected to be largely confined to the pipeline trench backfill materials and adjacent soils

3.12 Operable Unit 10 - Other Outside Closures

Information on the nature and extent of contamination is taken from Draft Final Phase I RFI/RI Work Plan, Rocky Flats Environmental Technology Site, Other Outside Closures (Operable Unit No 10) (DOE 1991j)

Analytical results for soil samples taken in the vicinity of the Oil Leak (IHSS 129) indicate the presence of organics including 1,1,1-trichloroethane, methylene chloride, benzene, toluene, ethylbenzene, 2-butanone, and total xylenes, and metals including mercury, cadmium, copper, and lead Radionuclides were not tested Groundwater data are not available for this site

No previous investigations have been performed at the P U & D Storage Yard (IHSS 170) so the nature and extent of contamination is unknown Soil sampling has been conducted at the Waste Spills (IHSS 174) Soils contain concentrations of volatile organics, metals, nitrates, and radionuclides above background levels Acetone, methylene chloride and nitrate/nitrite were detected in a groundwater sample from a well northeast of IHSSs 170 and 174

Soil samples were collected in the S&W Building 980 Container Storage Facility (IHSS 175) area in 1988 Volatile organics, metals, nitrate, and radionuclides were detected above background levels in the samples No groundwater data are known to have been collected

Analysis of soil samples taken from borings in the S&W Contractor Storage Yard (IHSS 176) indicate levels of volatile organics, metals, nitrate, and radionuclides above background concentrations Groundwater data from an upgradient well indicate the presence of metals, other inorganics, and radionuclides above background levels

Potential contaminants at IHSS 207, Former Building 444 Acid Dumpsters, are cadmium, chromium, lead, silver, and radionuclides No previous soil or water sampling investigations have been performed at the IHSS

No previous investigations have been conducted at the Inactive 444/447 Waste Storage Area (IHSS 208) or Unit 16, Building 980 Cargo Container (IHSS 210), so no information is available concerning the nature and extent of contamination

Analysis of soil samples taken in the area of the Unit 15, 904 Pad Pondcrete Storage Area (IHSS 213) indicated levels above background for gross alpha, gross beta, total plutonium, total uranium, uranium-234, uranium-238, americium-241, and plutonium-239 In addition, analysis of surface water samples taken in the area of IHSS 213 indicates levels above background for nitrate, cyanide, and cadmium Further data are needed to assess groundwater contamination

Soil samples taken from the Unit 25, 750 Pad Pondcrete and Saltcrete Storage Area (IHSS 214) indicate levels above background for gross alpha and gross beta Surface water samples have levels above background for nitrate, cyanide, and cadmium Further data are needed to assess groundwater contamination

3.13 Operable Unit 11 - West Spray Field

Information on the nature and extent of contamination is taken from Final Phase I RFI/RI Work Plan for OU11 (West Spray Field), Rocky Flats Environmental Technology Site (DOE 1991k)

The source of contamination to the West Spray Field is the liquids from the Solar Evaporation Ponds that were sprayed at the spray field The liquids are known to contain major ions, radionuclides, metals, and some organics Previous sampling has been done at the West Spray Field, and the results have been compared to background levels in the area

Soil samples from the spray field show slightly elevated levels of arsenic, lead, manganese, mercury, zinc and several volatile organic compounds Gross alpha, plutonium, uranium-233, -234, and -238 are also above background levels in soils Groundwater monitoring wells have been installed in the West Spray Field Alluvial groundwater quality is affected sporadically by several metals, radionuclides, nitrate, and tetrachloroethylene Two of the three bedrock wells have occasionally exhibited above-background concentrations of magnesium, strontium, and manganese The radionuclides and volatile organic compounds were not elevated Surface water sampling has not been done at the West Spray Field

3.14 Operable Unit 12 - 400/800 Area

Since previous investigations have not been conducted at these units, the nature and extent of contamination is based on materials stored at the sites and previous site uses (Rockwell International 1988, DOE 1992a)

Releases of radionuclides from buildings adjacent to the Multiple Solvent Sites (IHSSs 116 1 and 116 2) may have resulted in soil contamination at these sites Since the actual contents of the drums stored on the loading docks are unknown, it is assumed that volatile organic compounds may have been stored and may have leaked in the dock areas

At the Building 664 Fiberglassing Areas (IHSSs 120 1 and 120 2), the chemicals of interest are believed to be polyester resins (styrene monomer) and cleaning solvents Also, an area of significantly high radiation was measured directly west and overlapping the site

The potential contaminant at the Cooling Tower Ponds (IHSSs 136 1 and 136 2) is chromium Blowdown discharged to the ponds contained chromium and algaecides Uranium may also be buried at the pond sites

The Process Waste Leaks (IHSS 147 2) area may have been contaminated by infiltration of water that contacted equipment stored at the site The Radioactive Site South Area (IHSS 157 2) may be contaminated by uranium, beryllium and solvents Plutonium may also be present Contamination

is not expected at the Acid Leak sites (IHSS 187) or the Multiple Acid Spills (IHSS 189) since the acid was likely neutralized in the soil

3.15 Operable Unit 13 - 100 Area

Since previous investigations have not been conducted at these units, the nature and extent of contamination is based on materials stored at the sites and previous site uses (Rockwell International 1988, DOE 1992a)

The Chemical Storage Sites (IHSS 117 1-3) were used for storage of acids, organic solvents, soaps, and oils These materials are assumed to be the potential contaminants at these IHSSs

The Oil Burn Pit No 1 Waste Leak (IHSS 128) is a pit area that contains approximately 70 cubic feet of depleted uranium The Lithium Metal Destruction Site (IHSS 134) may contain residues of lithium and small amounts of sodium, calcium, and magnesium The lithium has likely reacted with the soil to form lithium carbonate Radionuclides may have been spilled at the Waste Spill (IHSS 148) site, although radioactive surveys of the area have found radioactivity levels consistent with background levels

Fuel oil is the potential contaminant at the Fuel Oil Tank Spill (IHSS 152) The Radioactive Site South Area (IHSS 157 1) may be contaminated by uranium, beryllium and solvents Plutonium may also be present The Radioactive Site - Building 551 (IHSS 158) is suspected of being contaminated with uranium The Waste Drum Peroxide Burial (IHSS 169) may still contain peroxide, which can be an explosion hazard The site is not considered to be a chemical hazard Residues of the burning of waste solvents are the concern at the Solvent Burning Ground (IHSS 171)

Radioactive process waste may have contaminated the Valve Vault 12 (IHSS 186) area Sodium hydroxide is the potential contaminant at IHSS 190, the Caustic Leak However, it is likely that any sodium hydroxide remaining in the environment would have been neutralized by the buffering

action of the soil The soil also would have buffered any remaining hydrogen peroxide from the Hydrogen Peroxide Spill (IHSS 191)

3.16 Operable Unit 14 - Radioactive Sites

Since previous investigations have not been conducted at these units, the nature and extent of contamination is based on materials stored at the sites and previous site uses (Rockwell International 1988, DOE 1992a)

Radioactive Site #1 - 700 Area (IHSS 131) and Radioactive Burial Site - Building 334 Parking Lot (IHSS 156 1) may have been contaminated by plutonium Small amounts of plutonium and uranium may have remained at the Building 444 Parking Lot (IHSS 160) and Building 664 (IHSS 161), however, no radioactivity above background levels was detected during the radiometric survey of the area The radioactive hot spots in the pavement on 8th Street may still exist as Radioactive Site #2 - 700 Area (IHSS 162) Radioactivity may also exist at the Radioactive Sites in the 800 Area (IHSS 164 1-3)

3.17 Operable Unit 15 - Inside Building Closures

Since previous investigations have not been conducted at these units, the nature and extent of contamination is based on materials stored at the sites and previous site uses (DOE 1988, DOE 1987, DOE 1992a)

Hazardous wastes such as volatile organic compounds and low-level radioactive waste oil have been stored in the Building 881 Drum Storage Area (IHSS 178) Waste oil contaminated with beryllium, and chlorinated solvents have been stored in the Building 865 Drum Storage Area (IHSS 179) Waste oil contaminated with volatile organic compounds, beryllium and radioactivity have been stored at the Building 883 Drum Storage Area (IHSS 180)

Uranium chips, coated with freon TF and 1,1,1-trichloroethane, were handled in the Original Chip Roaster (IHSS 204) The freon and 1,1,1-trichloroethane burned away during the roasting process

Low-level radioactive mixed wastes, including low-level combustibles, low-level metal and glass, low-level combustible hazardous waste and low-level glass and metal hazardous waste, were stored at Unit 26, Building 881 Drum Storage (IHSS 211) Transuranic wastes and solvents such as carbon tetrachloride, 1,1,1-trichloroethane, and toluene are stored in Unit 63, Building 371 Drum Storage (IHSS 212) Up to 4 liters of cyanide- contaminated laboratory wastes were stored in Unit 32, Building 881 Cyanide Bench Scale Treatment (IHSS 217)

3.18 Operable Unit 16 - Low-Priority Sites

Since previous investigations have not been conducted at these units, the nature and extent of contamination is based on materials stored at the sites and previous site uses (Rockwell International 1988, DOE 1992a)

The Solvent Spill (IHSS 185) was a spill of 1,1,1-trichloroethane The Antifreeze Discharge (IHSS 192) was a spill of ethylene glycol The spill was contained in Pond B-1 The Steam Condensate Leak (IHSS 193) contained amines The Steam Condensate Leaks (IHSS 194) contained tritium Nickel carbonyl is highly volatile and long-term environmental hazard would not result from the Nickel Carbonyl Disposal (IHSS 195)

Based on past uses, the water in the Water Treatment Plant Backwash Pond (IHSS 196) would have contained flocculates (aluminum sulfates and lime), residual chlorine, and suspended solids originating from RFETS soils and non-radiological controlled area residues

Transformers containing PCBs may have been disposed at the Scrap Metal Sites (IHSS 197)

3 19 Buffer Zone

For the purposes of this Health and Safety Plan, the Buffer Zone is considered to be an area that is not located within either an IHSS or a RCRA-regulated area, does not contain a groundwater contamination plume, and is not considered to be a radiologically controlled area due to surficial soil contamination

4.0 WORK ACTIVITIES

4 1 Introduction

This Health And Safety Plan (HASP) covers the Groundwater Monitoring Program activities listed in Subsection 4 2 when they are accomplished at RFETS

4.2 Activities

Procedures for accomplishing the activities covered by this HASP are contained in the RFETS Environmental Management Department (EMD) Operating Procedures Manual (OPM) Number 5-21000-OPS-FO, Volume I Field Operations, EMD OPM Number 5-21000-OPS-GT, Volume III Geotechnical and EMD OPM Number 5-21000-OPS-GW, Volume II Groundwater This HASP addresses activities described in the following EMD OPM standard operating procedures (SOPs) as listed below Additional SOPs related to the Groundwater Sampling Program will be added to the following list as they are developed and approved The listed SOPs are incorporated in this HASP by reference

OP No.	PROCEDURE
A	**Pre-installation planning for the groundwater monitoring well**
GT 6	Monitoring Well and Piezometer Installation
GT 18	Surface Geophysical Surveys
GT 10	Borehole Clearing
FO 16	Field Radiological Measurements
GT 24	Approval Process for Construction Activities on or Near Individual Hazardous Substance Sites
B	**Installation of the groundwater monitoring well**
FO 4	Heavy Equipment Decontamination
FO 12	Decontamination Facility Operations
FO 11	Field Communications
GW 5	Field Measurement of Groundwater
GT 2	Drilling and Sampling Using Hollow-Stem Auger Techniques
GT 4	Rotary Drilling and Rock Coring
FO 14	Field Data Management
FO 7	Handling of Decontamination Water and Wash Water
FO 6	Handling of Personal Protective Equipment
GT 3	Isolating Bedrock from Alluvium with Grouted Surface Casing
GT 6	Monitoring Well and Piezometer Installation
GW 2	Well Development
FO 8	Handling of Drilling Fluids and Cuttings
FO 10	Receiving, Labeling, and Handling Environmental Materials Containers
FO 23	Management of Soil and Sediment Investigative Derived Material (IDM)
FO 2	Transmittal of Field QA Records
GT 1	Logging Alluvial and Bedrock Material
GT 11	Plugging and Abandonment of Wells
GT 15	Geophysical Borehole Logging
GT 39	Push Subsurface Soil Sampling
C	**Sampling of the groundwater monitoring well**
FO 15	Photoionization detectors (PIDs) and Flame Ionization Detectors (FIDs)
GW 1	Water Level Measurements in Wells and Piezometers
GW 6	Groundwater Sampling
FO 5	Handling of Purge and Development Water
FO 3	General Equipment Decontamination
FO 13	Containerizing, Preserving, Handling, and Shipping of Soil and Water Samples
FO 25	Shipping Limited Quantities of Radioactive Materials in Samples

5.0 HAZARD ASSESSMENT

5 1 Overview

A review of Rocky Flats Environmental Technology Site history, previous studies of the regional animal life and climate, results of previous site investigations, and the general industry-wide experience with using heavy equipment indicate that there are several sources of potential hazards to be assessed The potential hazards have been placed into one of six classifications listed below

- Encounters with native wildlife including insects
- Climatic conditions such as temperature extremes, thunderstorms (lightning), and high winds
- Physical injury when working with light equipment, handling drums, and operating vehicles
- Electrical shock when working with equipment
- Exposure to radioisotopes such as plutonium, americium, and uranium in groundwater and wind-blown dust via absorption, injection, ingestion and inhalation Appendix B provides information regarding the characteristics of radioisotopes that may be encountered Appendix B also contains Table B-1, which includes the maximum and minimum radioactivity concentration per radioisotope that has been reported at RFETS
- Exposure to nonradioactive potentially hazardous substances such as metals and volatile organic compounds in groundwater and wind-blown dust via absorption, injection, ingestion and inhalation Appendix C contains Table C-1, which includes the maximum and minimum concentration of individual constituents reported in groundwater and soils at RFETS

5.2 Hazard Assessment Methodologies and Results

The following is a brief summary of hazard assessment methodology and the assessment results Detailed information regarding how hazard assessments were accomplished is presented in various attachments as specified in the text below

5.2.1 Methodology Employed to Assess Encounters with Wildlife, Environmental Extremes, Physical Injuries, and Electrical Shock When Working With Equipment

There is a certain likelihood for each of the potential hazard classifications listed in Subsection 5 1 above to become a true hazard An estimate of the likelihood of such occurrences for all classification of potential hazards has not been attempted The assessment of the first four classifications of potential hazard (encounters with native wildlife, environmental extremes, physical injuries and electrical shock) is subjective and indicates that they will exist at each work site, and, therefore, that steps must be taken to minimize the hazard (See Section 6 0, General Health and Safety Requirements, Section 7 0, Site-Specific Health and Safety Requirements, and various SOPs as listed in Section 4 2 and included in this HASP by reference

5.2.2 Methodology Employed to Assess Exposures to Radioisotopes and Nonradioactive Potentially Hazardous Chemicals

The assessments of the last two classifications of potential hazards (radioisotopes and nonradioactive potentially hazardous chemicals in various environmental media) are presented by discussing the four potential routes of exposure The routes of exposure discussed are absorption, injection (through the skin), ingestion, and inhalation

5.2.2.1 The Absorption, Injection, and Ingestion Routes of Exposure

A subjective manner of evaluation was used to assess the absorption, injection, and ingestion routes of exposure The assessment indicates that these three routes of exposure will exist at each work site, and, therefore, that steps must be taken to minimize exposures by these routes Methods of decreasing the likelihood of an exposure occurring via these routes are provided in Section 6 0, General Health and Safety Requirements, Section 7 0, Site-Specific Health and Safety Requirements, and various SOPs listed in Section 4 2 and included in this HASP by reference

5 2.2.2 The Inhalation Route of Exposure

The potential for radioisotopes and nonradioactive metals in surface or groundwater to become airborne during the tasks listed in Section 4 is very low

Predictions based on application of the DAC equation to historical site data indicate that worker exposures greater than the applicable occupational exposure limit are very unlikely when working with surface or groundwater However, prudent work practices, occupational exposure monitoring, and respiratory protection requirements to minimize exposures are established in Sections 6 and 7

Worker exposures to materials such as volatile and semivolatile organic compounds (VOCs and SVOCs) in concentrations greater than the applicable occupational exposure limit are very unlikely when working with liquids, soils or sediments In certain instances, airborne concentrations of these compounds may exceed Permissible Exposure Limits (PELs) Prudent work practices, environmental monitoring and respiratory protection requirements to address potential exposures are established in Sections 6 and 7

The following list of chemicals has been identified as having the highest potential for exposure while working on the project

Chemical	Predicted Maximum Airborne Concentration in ppm	PEL* in ppm	Percent Concentration of the PEL*
1,1-Dichloroethene	7 5	1	750
Benzene	0 082	0 1	82
Carbon Tetrachloride	0 0153	2	0 77
Methylene Chloride	0 434	25	1 74
Tetrachloroethylene	1 14	25	4 56
Vinyl Chloride	0 291	1	29 1

* PEL = Permissible Exposure Limit

6.0 GENERAL SITE-SPECIFIC HEALTH AND SAFETY REQUIREMENTS

6.1 Medical Surveillance

All persons assigned to work at RFETS on the groundwater monitoring program shall be active participants in a medical surveillance program as required by the Rocky Flats Health and Safety Practices Manual (HSP) Section 4 0, and equivalent to the requirements established by 29 CFR 1910 120 All medical examinations and procedures shall be performed by or under the supervision of a licensed physician, preferably an occupational physician Each subcontractor shall submit a medical surveillance program to RFETS for approval prior to initiating Groundwater Monitoring Program work

Radiation dosimeters and a Radiological Bioassay Program will be furnished by RFETS and are required for all field workers conducting tasks in Radiological- Areas (RAs), in accordance with the requirements of the HSP Sections 18 07 and 18 20

6.2 Safety Training

Employees shall not participate in field activities until they have been trained to a level required by their job function and responsibility Trainers will be trained in accordance with the requirements of Environmental Restoration Program Division - Training and Qualification (ERPD-T&Q) All training and field experience shall be documented and records of training documentation will be retained in the subcontractor Base Laboratory office Training and training records shall meet the requirements of Procedure ER-ADM-2 01, Training Minimum training requirements are discussed below

6.2.1 40-hour Basic Training

All on-site employees must have completed the 40-hour basic health and safety training, including Hazard Communication training, for Hazardous Waste Operations required under 29 CFR 1910 120 and receive 8-hour annual refresher training thereafter

6.2.2 Three-Day On-Site Supervision

All on-site employees shall be required to receive a minimum of 3 days of on-site field experience in compliance with 29 CFR 1910 120 under the supervision of a trained and experienced supervisor The trained and experienced supervisor will be experienced in the work that the employee is actually being trained in On-site time under supervision shall be documented using an RFETS-approved form An example of the RFETS-On-the-Job Training (OJT) form is provided in Appendix D

6.2.3 Radiation Worker Training

All field employees shall be required to receive Radiation Worker Training as required by HSP 18 02 per SITE RCM

6.2.4 On-Site Project Manager

The on-site subcontractor Project Manager (PM) must have completed the basic 40-hour training course, 3 days of on-site supervision and at least 8 hours of specialized training in an OSHA-approved course on managing hazardous waste operations The 8 hours of specialized training shall include instruction covering this Health And Safety Plan, employee training program, personal protective equipment program, spill containment procedures, and health hazard monitoring procedures

6.2.5 Site Safety Officer (SSO)

The Site Safety Officer must have completed the 40-hour training, 8-hour OSHA Refresher, 8-hour OSHA Supervisor training, Radworker II, 3-day on-site supervision, and training required by 29 CFR 1910 1030, Bloodborne Pathogens The SSO will be approved as a Health and Safety Specialist (HSS) by Radiological Engineering (RE) and Industrial Hygiene (IH) The SSO shall also possess current certificates of training in Adult CPR and American Red Cross Standard First Aid, and shall remain current on HSS Qualification Training

6.2.6 Health & Safety Specialist (HSS)

The Health and Safety Specialist (HSS) must have completed the 40-hour training, 8-hour OSHA Refresher, 8-hour OSHA Supervisor training, Radworker II, 3-day on-site supervision, and training required by 29 CFR 1910 1030, Bloodborne Pathogens The HSS will be approved by Radiological Engineering (RE) and Industrial Hygiene (IH) The HSS shall also possess current certificates of training in Adult CPR and American Red Cross Standard First Aid, and shall remain current on HSS Qualification Training

6.2.7 Site-Specific Safety Orientation Meeting

Each contractor, and subcontractor employee will receive a site-specific safety orientation prior to participation in the Groundwater Monitoring Program The following topics will be discussed at this meeting

- Names of health and safety personnel and alternates responsible for site health and safety,
- Health and safety organization,
- Location of Material Safety Data Sheets (MSDSs),
- Hazards at the site,
- Electrocution,
- Exposure risk,
- Personal protective equipment to be used,
- Personnel and equipment decontamination procedures,
- Air monitoring,
- Emergency procedures/contingency plans, and,
- Training requirements to perform tasks

A copy of this Health and Safety Plan must be made available to all project personnel At the end of the meeting, attendees should be informally quizzed to assess their understanding of the health and safety requirements, and should sign a safety compliance agreement form stating that they have read, understand, and agree to comply with the provisions of the plan Anyone refusing to sign the form will be prohibited from working at the site

If a new employee who has not gone through the site-specific safety orientation meeting is assigned to the site, the SSO must present a similar briefing to the new employee before he or she participates in any field activities All new employees must sign the safety compliance agreement form before beginning work A copy of the signed safety compliance agreement will be provided to the SSO prior to beginning work

6.2.8 Periodic Safety Meetings

Daily tailgate briefings are desirable but, as a minimum, weekly health and safety briefings will be conducted Additional health and safety briefings will be conducted when the site manager and the SSO agree that a given topic warrants immediate attention

6.2.9 Lifting

When lifting or carrying items is part of the job, it is each individual's responsibility to use the following guidelines

- Make sure there are no nails or other items protruding which may cause injury in the lifting and carrying procedure,
- Use a lifting belt when lifting heavy objects,
- Do not attempt to lift more than 50 pounds without assistance Items weighing more than 50 pounds should be lifted by two people, or with a fork lift or hand truck,

- When lifting, crouch as close to the object as practical, get a good grip on it, and keep feet apart, bending at the knees,
- Lift slowly by straightening legs,
- Keep back relatively straight when lifting, and,
- Use leg muscles, not back muscles

6.3 Visitor Clearances

All visitors to RFETS must be cleared by RFETS security personnel Visitors will be escorted at all times by site personnel They will be trained, at a minimum, in hazard recognition and personal protective equipment requirements appropriate for the activities in which they are to participate In general, visitors will be restricted to support zones, entrance into exclusion zones will require additional training in accordance with 29 CFR 1910 120 and Rocky Flats site- and task-specific training, as described in Section 6 2

6.4 Buddy System

The "buddy system" and radio communications will be used during all field activities at RFETS No field activities will be conducted on a "solo" basis

6 5 Work Zones

Work zones pertaining the to groundwater program will be established around each well when conducting Groundwater Monitoring Program tasks at the location International orange cones will be set out to delineate the work zone and include the truck and well in the work zone The decon tub(s) will be laid on visqueen or equivalent and will mark the line of most to least clean Two work zones (exclusion zone [EZ] and support zone [SZ]) will be established for areas which are not Radiological Areas or in areas where airborne volatile organic compound (VOC) concentrations do not exceed respiratory protection action levels, as discussed in Section 7 4 2 3

The three work zones (exclusion zone [EZ], contamination reduction zone [CRZ], and the support zone [SZ], modified to imply the back, or shell of the truck, inclusive of the cab) shall be established and used in Radiological Areas and in areas with airborne VOC concentrations exceeding respiratory protection action levels as described in Section 7 4 2 3 Radiological Operating Instructions (ROI) -1 03 will be consulted for posting requirements applicable to areas and equipment contaminated or potentially contaminated with radioactive materials

6.5.1 Exclusion Zone (EZ)

The Exclusion Zone (EZ) is a known contaminated or potentially contaminated area Exclusion zones established around wells will be clearly marked with international orange cones and be of a sufficient size to permit easy movement of personnel or equipment within the zone Access control points will be established at the periphery of each EZ to regulate and control the flow of personnel and equipment into and out of the zone and to help verify that proper procedures for entering and exiting are followed

When work is to be accomplished within a radiological area or areas with VOC contamination potentially exceeding action levels, the SSO will be notified and will ensure the following actions are taken

- Identification of the area in which work is to be accomplished,
- Determine the radiological contamination or VOC level,
- Instruct Rad Ops to Prepare a radiological work permit (RWP) if appropriate and contact RFETS Radiological Engineering,
- If appropriate, close off the work area with yellow and magenta tape or rope and post as a radiological area with appropriate entrance and exit signs,
- Establish a step-off pad for exiting the area,
- Don appropriate PPE,

- Seal and transport items that cannot be radiologically decontaminated at the step-off pad, per Field Operating Procedure F O 4, Section 6 4,
- When the item arrives at the decontamination facility, remove material used to seal contaminated area while wearing level of personal protective equipment specified in the RWP,
- Decontaminate item,
- Survey contaminated area to verify decontamination,
- Survey decontamination pad to verify decontamination,
- SSO will complete forms necessary to remove signs posted to mark the radiological area, and,
- Depost the area after proper notification

6.5.2 Contamination Reduction Zone (CRZ)

In general, the CRZ is established immediately outside the exclusion zone to minimize the migration of contaminants from the exclusion zone to clean or support areas, and to reduce the exposure potential of individuals leaving the exclusion zone Personnel decontamination will require establishing a step-off pad Minimum step-off pad requirements differ for radiological areas and non radiological areas

6.5.2.1 Radiological areas Step-off Pad Requirements

- Comply with RWP, ROI-2 01 and -2 03
- Place a sign with the proper warnings/notices so that persons cannot enter the radiological area without observing the sign Procedures for exiting the radiological area will be posted on the rear of the sign for review by persons exiting the radiological area,
- Lay visqueen or other heavy gauge plastic sheeting on the ground so that a few feet of it extends into the radiological area,

- Set up a table beside the visqueen so that half of the table is in the radiological area and the other half is outside of the radiological area,

- Position two personal protective equipment (PPE) containers with plastic liners beside the table One PPE container will be labeled "Contaminated PPE" and the other PPE container will be labeled "Uncontaminated PPE " Both containers shall be placed within the radiological area,

- Cover the table top with visqueen or other heavy gauge plastic sheeting Draw a line across the table top to indicate where the radiological area boundary crosses the table That half of the table inside the radiological area will be used to place equipment that is to be screened for contamination Equipment that has been screened and found free of contamination will be placed on the half of the table that is outside of the radiological area Equipment that has been screened and found to be contaminated will be examined for the presence of removable contamination If contamination is removable, the equipment will be re-decontaminated and re-monitored If the contamination is not removable, the equipment will be disposed of as radioactive waste and Radiological Engineer will be notified to take appropriate action,

- The HSS will be responsible for screening personnel as they depart the radiological area will wear PPE appropriate for the task, as described in FO 06, and stand on the visqueen immediately outside of the radiological area but near enough to the radiological area boundary to conduct personnel screening activities,

- Exit procedures will comply with ROI-2 01, PPE found to be contaminated with radioactive materials will be placed inside the "Contaminated PPE" container, other PPE items will be placed in the "Uncontaminated PPE" container Used PPE will be handled in accordance with the requirements of Standard Operating Procedure Field Operations 06, as summarized in Section 7 5 12,

- If skin contamination is found, the HSS will notify the SSO, Radiological Safety and Occupational Medicine and take measures to prevent or minimize the spread of contamination The contaminated individual shall be escorted to Occupational Medicine for decontamination, and,

- Respiratory protection will be the second to last PPE item monitored and removed if it was worn during the course of work within a radiological area Inner gloves will be the last PPE item removed

6.5.2.2 Non-radiological area Step-off Pad Requirements

In general, minimum step-off pad requirements for non- radiological area include

- Place a sign restricting access to the CRZ to authorized personnel only,

- Position a personal protective equipment (PPE) container with a plastic liner in the CRZ PPE will be handled in accordance with the requirements of FO 06, summarized in Section 7 5 12,

- Wash and rinse boots or properly containerize disposable booties upon exiting the CRZ, and,

- Remove PPE, if worn, in the appropriate sequence Respiratory protection, if worn, will be the second to last PPE item removed Inner gloves will be the last item removed

6.5.3 Support Zone

The support zone is located in a clean area, preferably upwind and immediately outside of the CRZ, or in the on-site vehicles Supplies, first aid kit, eye wash, fire extinguisher, and support personnel are located in the support zone or in the on-site vehicles

6.6 Field Activities

6.6.1 Personnel Requirements/Prohibitions

- All personnel will carry radios for communication while in the field,
- All personnel will be issued a buffer zone pass by Environmental Operations Management at T891E prior to entry into the buffer zone or will log into the buffer zone daily prior to entry Buffer zone rules will be obeyed,
- No running or horseplay,
- The required level of PPE must be worn by all on-site personnel,
- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in the EZ and the CRZ,
- Smoking is prohibited at the decontamination facility and in the buffer zone,
- No jewelry may be worn by personnel engaged in field work, except for watches, which will be disposed if they become contaminated,
- No facial hair which interferes with a satisfactory fit of the mask-to-face seal is allowed on personnel required to wear respirators,
- Medicine and alcohol can increase the effects from exposure to toxic chemicals Personnel taking prescription drugs are required to notify RFETS Occupational Health and Safety, and the SSO Alcoholic beverage intake will not be allowed on RFETS plant site,
- All field personnel will wear occupational protective footwear to comply with ANSI Z41 1,
- Any person who has a medical condition or allergy that could render them unconscious or result in a life-threatening situation will notify the Site Manager and the SSO and provide the appropriate response actions before beginning field work,
- Safety devices on equipment must be left intact and used as designed,
- Equipment and tools will be kept clean and in good repair and used only for their intended purpose Operations and Maintenance manuals for equipment used as part

of the Groundwater Monitoring Program shall be available at the subcontractor's Base Laboratory trailer,

- ANSI-approved safety glasses with side shields shall be worn in the exclusion zone and contamination reduction zone,
- Leather gloves must be worn when handling drums and nitrile gloves shall be used when handling any sample equipment, a combination of both will be used if deemed necessary by the HSS,
- Seat belts will be worn at all times while riding in a vehicle,
- Travel only on established roadways,
- Field laboratory type operations may not take place in the rear of the vehicle as the vehicle moves between sites, and,
- Drive slowly in the vicinity of the contractor facilities (5 mph maximum) When on site, park properly and within designated areas and watch for pedestrians and other vehicles

6.6.2 Contamination/Exposure Prevention

On-site personnel may become contaminated by

- Being splashed by contaminated liquids while sampling or handling liquids,
- Coming in contact with contaminated solids or liquids,
- Walking through contaminated materials, either in solid or liquid state,
- Being in contact with contaminated equipment,
- Being in contact with contaminated solid substances in waste piles or on the soil,
- Sitting or kneeling on the ground, and,
- Inhalation

On-site team members will avoid becoming contaminated as much as possible This will be accomplished by good work practices, as required by relevant SOPs, and by wearing Personal Protective Equipment (PPE), as described in Section 7 5

On-site personnel will avoid exposure to hazardous chemicals by strictly adhering to the required personal protection equipment and decontamination procedures

Care will be taken to prevent equipment damage from the elements or contamination as much as possible Sampling and monitoring equipment will not be laid on contaminated surfaces When decontaminating known radiological-contaminated equipment, monitoring equipment and communication equipment may be bagged, with the bag taped and secured around the instrument Openings will be made in the bag for sample intake and exhaust ports

Surfaces will be considered radiological contaminated if release limits for unrestricted release are exceeded Release limits for unrestricted release are established in ROI-3 02 and RFETS (Radiological Control Manual)

6.6.3 On-Site Travel

All traffic regulations shall be observed The following requirements will be observed at all times

- Seat belt use is required when riding in any motorized vehicle,
- Authorized plant speeds will not be exceeded,
- A safe distance shall be maintained (a minimum of approximately three truck lengths) from the vehicle ahead, and the truck shall be kept under control at all times,
- The right of way shall be yielded to ambulances, fire trucks, or other vehicles in emergency situations,
- Under all travel conditions, the truck shall be operated at a speed that will permit it to be brought to a stop in a safe manner, and,
- No smoking is permitted in government-owned vehicles

6.6.4 Housekeeping

Housekeeping is an important aspect of an investigation program and will be strongly stressed in all aspects of field work Good housekeeping plays a key role in occupational health protection and is a way of preventing dispersion of dangerous contaminants All work areas will be kept as clean as possible at all times, and spills will be cleaned up immediately Housekeeping will be the responsibility of all employees

6.7 Personal Protective Equipment (PPE)

It is expected that there will be a tailoring of Personal Protective Equipment (PPE) requirements for specific sites and seasonal variations Changes to PPE requirements established in this Health And Safety Plan shall be agreed upon by the On-site Project Manager and the SSO prior to review and approval for implementation by subcontractor HSO, Project Manager, and CHSO, and by the RMRS Project Manager, ERPD HSO, HS Liaison Officer, RE, and IH A document authorizing such changes will be developed, dated, and signed by the On-site Project Manager and HSO The SSO shall post PPE requirements in the crew trailer, announce changes and justification for those changes at a site safety meeting, and provide a copy of the change in PPE requirements to the HSO responsible for developing the Health And Safety Plan Rocky Flats will publish a change to this plan if PPE changes are permanent and if the changes are considered substantive

6.7.1 Clothing

Personal protective equipment should be inspected before use The following checks should be made before use

- Determine that the clothing material is correct for the specific task at hand,
- Visually inspect for
  - Imperfect seams,
  - Tears, and,
  - Malfunctioning closures

- Hold up to light and check for pinholes

During the work task, periodically inspect for the following

- Evidence of chemical attack such as discoloration, swelling, stiffening, and softening Keep in mind, however, that chemical permeation can occur without any visible effects,
- Closure failure,
- Tears,
- Punctures, and,
- Seam discontinuities

6.7.2 Protective-toe Footwear, Safety Glasses, and Hard Hats

Protective toe footwear requirements are identified in HSP 7 02, "Occupational Foot Protection " Appropriate footwear for Groundwater Monitoring Program activities are ANSI (Z41-1991) approved over-the-ankle safety boots or shoes Safety glasses requirements are identified in HSP 7 01, "Eye and Face Protection Program," and include ANSI Standard Z87 1 safety glasses with side shields Hard hats will comply with HSP 7 07, "Head Protection," satisfy ANSI Standard Z89 1, and be worn when required for protection from overhead hazards are present

6.7.3 Respirators

Respirators are to be inspected by looking for missing or damaged inhalation/exhalation valves, straps, buckles, and face shields, as well as their overall cleanliness Respirators will be inspected according to an Rocky Flats-approved schedule established by the subcontractor, as outlined in Section 7 4 2 Subcontractor personnel will be certified to wear respirators and have the RFETS respirator card in their possession when working in a situation requiring the use of respirator

6 8 Emergency Equipment

The following emergency equipment will be readily available at the subcontractor Base Laboratory trailer and in each field vehicle

- Comfort Kit,
- 16 Ounce eye wash bottle in field vehicles and 15 minute eye wash station at Base laboratory,
- Potable water, Gatorade[tm], or equivalent,
- Fire extinguisher (2 5lb ABC for field vehicles and 10lb ABC for Base Laboratory), and,
- An extra full set of the appropriate PPE for each team member

6 9 Temperature Stress

Temperature stress can be induced by both hot and cold environmental conditions

6.9.1 Heat Stress

Heat stress is probably one of the most common illnesses experienced by outdoor workers wearing PPE Health effects resulting from heat stress can range from transient heat fatigue to serious illness and death Signs and symptoms of the stages of heat stress, presented in order of progression, are provide in the following paragraphs This information is duplicated in Table 6-1 for easy reference

Heat Rash

Heat rash may result from continuous exposure to heat or humid air Signs of heat rash include reddening of the skin and increased sweating

Heat Cramps

Heat cramps are caused by heavy sweating with inadequate electrolyte replacement Signs and symptoms of heat cramps include muscle spasms and pain in the hands, feet, or abdomen

Heat Exhaustion

Heat exhaustion occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration Signs and symptoms of heat exhaustion include

- Pale, cool, moist skin,
- Heavy sweating,
- Dizziness,
- Nausea, and,
- Fainting

Heat Stroke

Heat stroke is the most serious form of heat stress Temperature regulation fails and the body temperature rises to critical levels Immediate action must be taken to cool the body before serious injury or death occur Medical help must be obtained Signs and symptoms of heat stroke include

- Red, hot, usually dry skin,
- Lack of or reduced perspiration,
- Nausea,
- Dizziness and confusion,
- Strong, rapid pulse, and,
- Coma

Heat stress monitoring, as described in the following section, will assist in identify or preventing the progression of heat stress stages identified above

6.9.2 Heat Stress Monitoring

A Wet Bulb Globe Temperature (WBGT) Instrument will be used to monitor employee exposure to heat stress condition, with the action level and work/rest regimen being based on the latest published values by the American Conference of Governmental Industrial Hygienists Monitoring for heat stress will begin at 70 degrees Fahrenheit Personnel should be alert for the signs and symptoms of heat stress, as described above and in Table 6-1

Since measurement of deep body temperature is impractical for monitoring the employees' heat load, the measurement of environmental factors which most nearly correlate with deep body temperature and other physiological responses to heat is required At the present time, WBGT Index is the simplest and most suitable technique to measure the environmental factors WBGT values are calculated by the following equations

- Outdoors with solar load
  WBGT = 0 7 NWB + 0 2 GT + 0 1 DB

- Indoors or outdoors with no solar load
  WBGT = 0 7 NWB + 0 3 GT

where

WBGT=	Wet Bulb GlobeTemperature Index	
NWB	=	Natural Wet-Bulb Temperature
DB	=	Dry-Bulb Temperature
GT	=	Globe Temperature

The determination of WBGT requires the use of a black globe thermometer, a natural (static) wet-bulb thermometer, and a dry-bulb thermometer, such as the Reuter-Stokes Thermo-environmental Monitor Calculated WBGT values will be compared to the permissible heat exposure limits provided in Table 6-2 (adapted from ACGIH 1996 TLVs "or current year" after "1996") and utilized to determine work/rest regimes, as described in the following paragraphs

As previously stated, heat stress monitoring will begin when ambient air temperatures exceed 70°F Heat stress will be monitored by checking Heart Rate during a 30 second period as early as possible in the rest period If the heart rate exceeds 110 beats per minute or 75 beats per 30 seconds, the next work cycle will be shortened by one-third Oral temperature will be taken with clinical thermometer (3 minutes under the tongue) at the end of each work cycle after appropriate documentation (before drinking water) If oral temperature exceeds 99 6°F, the next work cycle will be shortened by an additional one-third without changing the rest period If at any time oral temperature exceed 100 4°F, work will be stopped and the person will not be allowed to work with impermeable PPE clothing such as Tyvek[tm]

Work schedules and work/rest schedules will be adjusted and modified according to monitoring requirements Work slowdowns will be mandated as needed

Personnel will be rotated to alternate job functions and minimize overexertion at one task Additional personnel will be added to work teams as needed Shelter will be provided during break periods, crew members may sit inside trucks with air conditioning going Care will be taken to avoid shocking temperature extremes workers will be instructed to gradually decrease temperature in air conditioned trucks at the initiation of break periods, and gradually increase the temperature before resuming work Crew members will be required to drink plenty of water before going out into field and at break time At lunch time, workers will be encouraged to salt their foods

As many of the following control measures as are appropriate to site conditions shall be utilized to aid in controlling heat stress

- Provide adequate liquids to replace lost body fluids and replace water and salt lost from sweating Encourage personnel to drink more than the amount required to satisfy thirst Thirst satisfaction is not an accurate indicator of adequate salt and fluid replacement,

- Replace fluids with water, commercial mixes such as Gatorade[tm] or Quick Kick[tm], or a combination of these,

- Establish a work regimen that will provide adequate rest periods for cooling down This may require additional shifts of workers,
- Take all breaks in a cool rest area (approximately 77 degrees Fahrenheit),
- Remove impermeable protective garments such as Tvyek[tm] or Saranex[tm] during rest periods,
- Do not assign other tasks to personnel during rest periods, and,
- Inform personnel of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress

6.9.3 Cold Stress

Fatal exposure to cold among workers has almost always resulted from accidental exposures involving failure to escape from low air temperatures or immersion in low temperature water The single most important aspect of life-threatening hypothermia is the fall in deep core temperature of the body Employees should be protected from exposure to cold so that the deep core temperature does not fall below 97°F Lower body temperature will very likely result in reduced mental alertness, reduction in rational decision making, or loss of consciousness with the threat of death Adequate dry clothing must be provided to workers if work is to be performed in air temperatures below 40°F (4°C)

6.9.4 Cold Stress Monitoring

For exposed skin, continuous exposure should not be permitted when the air speed and temperature results in an equivalent chill temperature of 40°F (4°C) At temperatures of 36°F (2°C) or less, it is imperative that employees who become immersed in water or whose clothing becomes wet be immediately provided with a change of clothing and be treated for hypothermia Special protection of the hands is required to maintain manual dexterity for the prevention of accidents

- Work Below 40 Degrees Fahrenheit (4°C) (including wind chill) Provisions for additional total body protection is required if work is performed at or below 40 degrees Fahrenheit as follows

  - The employees shall wear cold-protective clothing appropriate for the level of cold and physical activity

  - If the air velocity at the site is increased by wind or artificial ventilation, the cooling effect of the wind shall be reduced by wearing a removable outer windbreak garment

  - If the clothing on the employee may become wet on the job site, the outer layer of the clothing used should be water repellent

  - If the available clothing does not give adequate protection to prevent hypothermia or frostbite, work shall be modified or suspended until adequate clothing is made available or until weather conditions improve

  - Employees handling evaporative liquids at temperatures below 4 degrees Celsius shall take special precautions to avoid soaking of clothing or gloves due to the added danger of cold injury due to the evaporative cooling

- Work Below 10 Degrees Fahrenheit (-12°C) (including wind chill) For work practices at or below 10°F (-12°C), the following shall apply

  - The worker shall be under constant protective observation (buddy system)

  - If work must be done, rest periods must be taken in heated shelters and opportunity for changing into dry clothing shall be provided

  - New employees shall not be required to work full-time in cold the first few days until they become accustomed to the working conditions and required protective clothing

  - The work shall be arranged in such a way that sitting still or standing still for long periods is minimized

  - The workers shall be instructed in health and safety procedures

6.9.5 Training

The training program for temperature stress shall include as a minimum, instruction in

- Proper rewarming procedures and appropriate first aid treatment,
- Proper clothing practices,
- Proper eating and drinking habits,
- Recognition of impending frostbite,
- Recognition signs and symptoms of hypothermia or excessive cooling of the body even when shivering does not occur, and,
- Safe work practices

6.10 Work During Darkness

On occasion, field work will occur after daylight hours Examples of such work may include, but are not limited to, aquifer testing, pump testing, and slug testing When after-daylight hours work is to be performed health and safety provisions as outlined in the HASP for daylight work will again be required to ensure workplace monitoring and emergency response provisions of the HASP during after-daylight hours work are being met Such provisions include

- A Health and Safety Specialist (HSS) will be on duty at the work site performing all required monitoring and compliance-oriented tasks as is normally performed during daylight hours,
- The "buddy" system will be adhered to at all times at the work site,
- Light plants will be utilized for providing adequate illumination of work activities per 29 CFR 1926 56 - Illumination Illumination will be provided by a diesel-powered Allmand Brothers Maxlite III light plant capable of 440,000 lumens light intensity or equivalent The light plant will be self-grounding and will be equipped with a ground fault circuit interrupter Potentially explosive atmospheres are not expected Therefore, the light plant will not require explosion prevention features,

- Radio communications between the site crew and the HSS will be maintained at all times,
- Telephone communications between the Base Laboratory and the Fire Department (if the Medical Facility is closed) will be maintained at all times,
- RMRS Health and Safety Supervisor, Security, the Site Manager and the Shift Superintendent will be notified regarding after-daylight hours work schedules, and,
- Ø Personnel who are scheduled to work after-daylight hours will sign in and out on the sign-out log book located in the Base Laboratory

6.11 Confined Space Work

No work in confined spaces or places with limited egress is permitted by this plan

According to the final regulations from OSHA on confined spaces (29 CFR 1910 146), a "permit required" confined space is an enclosed space which

- Is large enough and so configured that an employee can bodily enter and perform assigned work,
- Has limited or restricted means for entry and exit (e g , tanks, vessels, silos, storage bins, hoppers, vaults, pits, and diked areas),
- Is not designed for continuous employee occupancy, and,
- Has one or more of the following characteristics
  - Contains or has a known potential to contain a hazardous atmosphere
  - Contains a material with the potential for engulfment of an entrant
  - Has an internal configuration such that an entrant could be trapped or asphyxiated by inward converging walls, or a floor which slopes downward and tapers to a smaller cross-section
  - Contains any other recognized serious safety and health hazard

No confined spaces have been identified as work areas under this HASP If additional sites are added, they will have to be evaluated for confined space entry requirements

6.12 Thunderstorms and Tornadoes

Meteorological conditions shall be closely watched, especially in the spring, when severe thunderstorms, lightning and tornadoes are most likely to occur Thunderstorms, lightning and tornadoes often occur late in the afternoon on hot spring days, but can occur at any time of the day in any season of the year Tornadoes are usually preceded by severe thunderstorms with frequent lightning, heavy rains, and strong winds

A severe thunderstorm watch or a tornado watch announcement on the radio indicates that a severe thunderstorm or tornado is possible Normally work will continue at the work site during severe thunderstorm watches or tornado watches A severe thunderstorm warning or a tornado warning signifies that a severe thunderstorm or a tornado has been sighted or detected by radar and may be approaching Normally, work on site shall cease during a severe thunderstorm warning or tornado warning Decisions to cease work will be made after consultation between the SSO and the site manager Emergency actions to be taken during a tornado are provided in Section 8 0 High wind warning levels, alarms, and responses are described in FO 01, "Air Monitoring and Dust Control," incorporated in this HASP by reference

6.13 Hand Tools and Portable Power Tools

Hand tools are non-powered They include anything from axes to wrenches The greatest hazards posed by hand tools result from misuse and improper maintenance Power tools can be hazardous when improperly used There are several types of power tools, based on the power source they use electric, pneumatic, liquid fuel, hydraulic, and power-actuated

6.13.1 General Requirements

- Hazardous moving parts must be covered/guarded if such parts are exposed to contact by workers Safety guards will not be removed when a tool is being used,
- Keep all tools in good condition with regular maintenance,

- Use the right tool for the job,
- Examine each tool for damage before use,
- Operate according to the manufacturer's instructions,
- Provide and use the right protective equipment,
- Compressed air will not be used for cleaning purposes except where reduced to less than 30 pounds per square inch (psi) and then only with effective personal protective equipment,
- The use of compressed air for blowing dirt from hands, face, or clothing is prohibited, and,
- Liquid fueled tools will be shut off and allowed to cool before fuel is added

6.13.2 Hand Tool Requirements

- All hand tools shall be in good repair and used only for the purpose for which designed,
- Tools having defects that will impair their strength or render them unsafe shall be removed from service,
- When work is being performed overhead, tools not in use shall be secured or placed in holders,
- Throwing tools or materials from one location to another, from one person to another, or dropping them to lower levels, shall not be permitted,
- Only nonsparking tools shall be used in locations where sources of ignition may cause a fire or explosion, and,

- Tools requiring heat treating shall be tempered, formed, dressed, and sharpened by personnel who are experienced in these operations

6.13.3 Power Tool Requirements

- Rotating or reciprocating portable power tools shall be guarded with manufacturer provided guards,

- Power tools shall be inspected, tested, and determined to be in safe operating condition prior to use Continued periodic inspections shall be made to ensure safe operating condition and proper maintenance,

- Rotating or reciprocating portable power tools shall have a constant pressure switch that will shut off the power when the tool is released by the operator A portable power tool may have a lock-on control provided turn-off can be accomplished by a single motion of the same finger or fingers that turned it on,

- Loose and frayed clothing, loose long hair, dangling jewelry, rings, chains, and wrist watches shall not be worn while working with any power tool or machine,

- Never carry a tool by the cord or hose,

- Never yank the cord or the hose to disconnect it from the receptacle,

- Keep cords and hoses away from heat, oil, and sharp edges,

- Disconnect tools when not in use, before servicing, and when changing accessories such as blades, bits and cutters,

- All observers should be kept at a safe distance away from the work area,

- Secure work with clamps or a vise, freeing both hands to operate the tool,

- Avoid accidental starting The worker should not hold a finger on the switch button while carrying a plugged-in tool,

- Tools should be maintained with care They should be kept sharp and clean for the best performance Follow instructions in the user's manual for lubricating and changing accessories,

- Be sure to keep good footing and maintain good balance,

- The proper apparel should be worn Loose clothing, ties, or jewelry can become caught in moving parts,

- All portable electric tools that are damaged shall be removed from use and tagged "Do Not Use",

- Electric tools must either have a three-wire cord with ground and be grounded or be double insulated And, each electric tool used at the decontamination facility will have a ground-fault circuit interrupter placed in line between the tool and the power source, and,

- The pressurized steam cleaner at the decontamination facility shall be inspected prior to use for evidence of loose or frayed electrical connections, corroded or baking water connections, and fuel or oil leakage The cleaner will not be used if any of these conditions exist, the conditions will be corrected prior to use Care shall be taken when operating the steam cleaner, with special attention paid to hazards presented by high pressure and temperature Operators shall be aware of burn and cut potentials associated with steam cleaner operation Under no circumstances will the wand be pointed at any body part Operators will be especially careful to avoid contacting extremities with the wash stream.

6 14 Electrical Safety

The use of electrical energy always entails a potential for electrical shock The use of electrical energy in a damp/moist environment such as outdoors during inclement weather or when processing water samples that could be spilled results in an increased potential for electrical shock The following requirements will be implemented

- All electrical wiring and equipment shall be a type listed by the Underwriters Laboratory (UL) or Factory Mutual Engineering Corporation (FM),

- Electrical wire or flexible cord passing through work areas shall be covered or elevated to protect it from damage by foot traffic, vehicles, sharp corners, projections, or pinching,

- Attachment plugs shall be constructed so that they will endure rough use and be equipped with a cord grip to prevent strain on the terminal screws,

- Flexible cord shall be used only in continuous lengths Splicing of flexible cords is not permitted,

- Patched, oil soaked, worn, or frayed electrical cords shall not be used,
- Electrical cords will not be fastened with staples, hung from nails, or suspended by bare wire,
- Plugs and receptacles shall be of an approved submersible type,
- Ground fault circuit interrupters (GFCIs) are required in all circuits used for portable tools GFCIs shall be trip tested before use (each day of use) by pressing the test button If a test button is not present, the manufacturer instructions for testing will be followed,
- A ground strap will be used between the frame of portable generators and a grounding rod if required by the manufacturer Grounding rods must be 5/8-inch diameter steel or iron rods, 1/2-inch diameter copper clad steel, or 3/4-inch diameter galvanized pipe They shall be in unbroken 8-foot lengths and driven to full depth,
- Grounding clamps/clips shall be attached before circuits are energized A secure and positive metal-to-metal contact shall be made Grounding clamps/clips shall not be removed until the circuits are de-energized,
- Weatherproof wiring shall be used Receptacles shall be contained in a weatherproof enclosure the integrity of which is not affected when an attachment plug is inserted,
- Wiring used outdoors shall be hard usage or extra hard usage Approved cords may be identified by the word "outdoor" or letters "WA" on the jacket,
- Flexible cords shall be connected to devices and fittings to provide strain relief to prevent pull from being transmitted to joints or terminal screws,
- Keep all electrical equipment and hands dry,
- Do not attempt to repair electrical equipment Electrical equipment that fails will be disposed of or repaired by a qualified person,
- Never try to bypass any safety device on electrical equipment, and,
- In case of fire on or near any electrical equipment, use only a class "C" carbon dioxide or dry chemical fire extinguisher

Emergency procedures for dealing with electrical shock are provided in Section 8 0

6.15 Laboratory Safety

6.15.1 Base Laboratory

Various analytical methods require that a preservative be added to the sample to be analyzed These preservatives will be added to empty sample containers by the sample manager working in the Base Laboratory Those preservatives being used are

- Nitric Acid (HNO_3),
- Sulfuric Acid (H_2SO_4),
- Sodium Hydroxide liquid (NaOH),
- Sodium Thiosulfate granular ($Na_2S_2O_3$),
- Hydrochloric Acid (HCl),
- Ascorbic Acid powder ($C_6H_8O_6$), and,
- Zinc Acetate (Zn ($C_2H_3O_2$))

Material Safety Data Sheets (MSDSs) for these preservatives will be retained on file in the subcontractor Base Laboratory trailer Only those personnel directly involved in the process of adding the preservatives to the containers will be allowed in the properly ventilated clean room while this activity is being performed No one shall handle preservatives while alone in the trailer Preservatives will not be handled without the SSO being on site and knowledgeable that preservatives are being handled All persons working with acids will wear chemical-resistant apron and gloves and Class III eye protection (chemical goggles and a face shield) Those responsible for dispensing the preservatives will be thoroughly trained by an experienced sample manager in the conduct of these operations, the safety aspects of the job, and in emergency procedures

Sample containers made of glass require the wearing of protective eyewear whether they contain preservatives or not All containers should be handled with protective gloves in order to prevent possible contamination of the container prior to sampling Samples being brought in from the field for packaging and distribution will be handled only by personnel wearing protective eyewear and protective gloves

Accuvac[tm] reagent vials will be handled and disposed of according to SOP FO 21 (proposed)

6.15.2 General Safety

These general safety rules and precautions are applicable to all employees regardless of work areas In addition to the general rules, employees who perform specialized jobs are to be thoroughly familiar with the safety rules pertaining to their unique tasks as outlined in the various sections

- Warn a person in the immediate vicinity of unsafe conditions,
- No person shall proceed against or disregard any warning given by word of mouth, sign, or signal,
- Everyone is responsible for keeping his or her working place clean Keep tripping hazards out of places where employees walk,
- Whenever stacking is part of your assigned task, it is your responsibility not only to stack material so that there is no danger of its falling, but also to stack it within prescribed areas allowing all aisles and work spaces to remain free,
- Always use the stair handrails and never jump from platforms, scaffolds, loading docks, or other elevations,
- Chemical labels shall be read and followed, particularly those which contain instructions in the use of the chemical to avoid harmful exposure to the employee,
- Employees must use a face shield when handling, pipetting, or pouring containers of acid, caustics, or other corrosive liquids,
- Eating or drinking in the laboratory areas is absolutely prohibited,
- At no time is a person to perform laboratory work while alone in the building,
- Never use mouth suction to pipette, a pipette bulb, or repeated use of a pipette will be used,
- Laboratory benches and aisles should not be used as storage areas,
- Fire extinguisher and eyewash fountains with 15-minute irrigation capacities are to be kept clear and readily accessible,

- Do not pick up broken glass with bare hands, use gloves or sweep it up Fine glass particles should be picked up with wet paper towels, and,

- All preserved bottles will have full name or chemical formula written on the container

6.15.3 Storage and Handling of Chemicals

- Generally, heavy items or large containers should be stored on or as near the floor as possible with smaller items and containers on the upper shelves,

- Chemicals which might react together to produce dangerous fumes, fire, or explosion must not be stored in the same container cabinet,

- Acids and bases should be stored separately in cabinets designed for such use,

- All containers must be labeled plainly,

- If exact information is not received with shipment of new or unfamiliar types and potencies of chemicals, request the manufacturer/supplier furnish a Material Safety Data Sheet (MSDS) with his recommendations before proceeding with laboratory use,

- When diluting acid, always pour the acid into water, never pour water into acid Pouring water into acid may cause a reaction In the case of field sampling, it has been determined that adding sample water to acid-prepared sample containers poses no significant risk, although care should be taken not to have sample containers and sample water near the sampler's face during filling operations,

- Always flush or wipe down (with premoistened towelettes) the outside of acid bottles before opening them Do not lay the stopper down on any surface where another person may rest his hand or arm Keep acid bottles stoppered tightly, and flush and dry them before replacement on the reagent shelf Make certain that no spillage remains on tables, floors, or bottles, and,

- Never carry open containers of dangerous chemicals from place to place, containers should always be covered or sealed

7.0 SITE-SPECIFIC PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

7 1 Introduction

This section describes the specific health and safety requirements of the Groundwater Monitoring Program operations Activities conducted as regular part of the Groundwater Monitoring Program include water level measurements in wells and piezometers, well development, field measurement of groundwater field parameters, and groundwater sampling Other, less common activities include packer tests, slug tests, and aquifer pumping tests Procedures for the specific tasks are provided in the EMD Manual Operation Standard Operating Procedures (SOP) Groundwater (GW) guidance document Additional procedures for general tasks are provided in the SOP Field Operations (FO) guidance document and include requirements for decontamination, instrument use, sample shipping, and other tasks Described in the following sections are

- Monitoring instruments utilized to detect the presence of radioactive and chemical substances potentially presenting a risk to human health and the environment,
- Outline monitoring strategies utilized by health and safety personnel,
- Explain personnel protective equipment (PPE) ensembles designed to protect field personnel from identified health risks, and,
- Provide specific information about personal protective equipment ensembles utilized while performing Groundwater Monitoring Program tasks as described in SOP GWs and FOs

7 2 Monitoring Instruments

7.2.1 Radioactive Substance Monitoring Instruments

Various instruments are used to monitor for the presence of radioactive substances on equipment and personnel conducting Groundwater Monitoring Program activities Action levels are presented in the appropriate ROI documents The following instrumentation is used

- A Bicron™ Field Instrument for the Detection of Low Energy Radiation (FIDLER) (or equivalent) is used to prescreen sites and monitor low level gamma radiation on PPE prior to disposal,

- A Electra with DP6 probe (or equivalent) is used to detect alpha and beta contaminants during any survey of personnel or equipment,

- A Ludlum™ Model 2929 (or equivalent) is used to survey smear samples for alpha, beta, and gamma radiation contamination on various items for release to an unrestricted environment,

- A Bicron™ A-100 (or equivalent) is used to detect alpha contaminants during any survey of personnel or equipment, and,

- A Bicron™ B-50 (or equivalent) is used to detect beta contaminants during any survey of personnel or equipment

The FIDLER is calibrated and source-checked by Rocky Flats Radiation Instrumentation (RI) on a 24-hour usage basis All other instrumentation is calibrated and source-checked by the subcontractor HSS Such calibration is approved and reviewed by RI or HPIC Radiological instruments will be performance-checked against a radiation source of know radiation activity levels in accordance with the following schedule All radiological instruments are performance-checked by RI on a semiannual basis, when calibration expires, and when instrument is damaged or not responding properly All instruments except the FIDLER will be performance-checked, in accordance with ROI-6 0, INSTRUMENTATION, daily or when in use by the HSS

7.2.2 Chemical Substance Monitoring Instruments

Instruments utilized to monitor chemical substances include organic vapor detectors, colormetric detector tubes, and combustible gas indicators

- An HNu™ PA-101 (or equivalent such as a ThermoDynamics™ Organic Vapor Monitor or RAE Systems™ Mini-RAE) photoionization detector (PID) is utilized to detect organic vapors when opening well casings The HNu™ is capable of ionizing compounds with an ionization potential of less than 11 27 eV (electron volts),

- Drager[tm] colormetric detector tubes (or equivalent) are utilized to detect the presence of and quantify volatile organic compounds of concern (see Table 5-1) in the event of positive readings observed during PID monitoring, and,

- A Bacharach[tm] Sentinel 44 (or equivalent) combustible gas indicator (CGI) is used to monitor oxygen and explosive gas concentrations in "methane wells" located in or near the site landfill

The use and operation of the PID is outlined in Field Operations guidance FO 15 The PID and the CGI are calibrated by the subcontractor HSS on a daily or as-needed basis

7.3 Monitoring Strategies

The objectives of site monitoring are to provide a rational basis for the selection of appropriate levels of personal protective equipment and work practice controls, and to document and verify that the selected hazard control procedures are appropriate for actual site conditions

Real-time monitoring activities conducted as part of the Groundwater Monitoring Program includes field screening of equipment and sample containers for the presence of radioactive substances Additionally, wells are surveyed for the presence of volatile organic compounds (VOCs) inside the well casing prior to initiating any intrusive activities Historical air monitoring data, as discussed in Section 7 4 2 2, will also be utilized to assess the potential for the presence of VOCs at well sites Furthermore, the presence of explosive concentrations of gases is measured in "methane wells" located in or near the site landfill prior to initiating any intrusive activities Health and safety practices to be utilized when conducting field screening are provided in the following subsections

7.3.1 Monitoring for Radioactive Substances

Field screening for radioactive substances will be performed in accordance with appropriate ROI documents Detailed usage methodologies and action levels are provided in the ROIs The HSS will maintain a set of current ROIs to serve as ready reference

Frequencies of radiological surveys will be determined by the subcontractor HSS in consultation with Radiological Engineering (RE), and in accordance with ROI-3 01, ROI-3 02

7.3.2 Monitoring for Chemical Substances

Real-time air monitoring will be conducted with the photoionization detector (PID) to provide an indication of potential volatile organic compound (VOC) hazards Historical air monitoring data, as discussed in Section 7 4 2 2, will also be utilized to identify the potential for the presence of VOCs The PID will be used as a screening device while performing activities having a reasonable potential for exposure to organic vapors, such as opening groundwater monitoring well casings If levels of organic vapors above background levels are detected, Drager™ colormetric detector tubes (or equivalent) will be utilized to assist in the identification and quantification of the specific compounds The results of the monitoring will be compared to action levels to determine the appropriate level of PPE according to the decision logic provided in Section 7 4 2 2 Action levels for chemical substances are discussed in Section 7 4 2 3 and provided in Table 7-2 The following paragraphs describe monitoring strategies used for detecting chemical substances The reader is instructed to refer to Section 7 4 3 for definitions of PPE ensembles

Field personnel will follow the monitoring procedures detailed below when opening well casings prior to conducting any intrusive activities Available data will be reviewed for information about potentially hazardous VOCs associated with the well Data may be obtained from the previous laboratory analytical results, if prior sampling and analysis has been conducted If no data is available, the "worst case" scenario will be assumed

7.3.2.1 Photoionization Detector Monitoring

PID monitoring will be conducted only with a PID utilizing a lamp of at least 11 7 eV Field personnel will verify the use of correct lamp prior to any monitoring

The well will be approached from upwind while wearing Level D PPE and conducting continuous air monitoring with the PID The well casing will be opened the minimum amount necessary to

insert the PID probe and conduct headspace monitoring Positive headspace readings will require immediate breathing zone monitoring If PID readings indicate that breathing zone VOC levels are at or below background readings, work may proceed Breathing zone VOC concentrations above background levels will warrant the workers exiting the work zone, contacting the HSS, and conducting colormetric detector tube monitoring for compounds of concern if requested, as described below

7.3.2.2 Colormetric Detector Tube Monitoring

The following volatile organic compounds of concern have been identified as reasonably anticipated to be present

- Benzene,
- Carbon Tetrachloride,
- Chloroform,
- 1,1-Dichloroethene (vinylidene chloride),
- Methylene Chloride,
- Tetrachloroethane, and,
- Vinyl Chloride
- Tetrachlorethylene

Colormetric detector tube monitoring will be conducted if requested by the HSS in order to verify or eliminate the presence of these compounds Readings at concentrations which exceed action levels presented in Section 7 4 2 3 for these compounds will require workers to exit the work zone Workers will contact the HSS for instruction on the procedures to follow The HSS, at his discretion, may elect to either allow the well to vent, with periodic monitoring to measure VOC and compound of concern concentrations, or require workers to conduct activities in Level C respiratory protection In no case will the HSS require Level C work if concentrations of compounds of concern exceed maximum use concentrations for air purifying respirators The presence of compounds with poor warning qualities, such as benzene, carbon tetrachloride, methylene chloride,

chloroform, or vinyl chloride, will require the utilization of Level B respiratory protection Level C (or lower) respiratory protection may not be utilized in the presence of these compounds If such conditions exist, the well will be allowed to vent until concentrations less than maximum use concentrations are attained prior to continuation of work at that site

7.3.2.3 Combustible Gas Indicator Monitoring

When conducting Groundwater Monitoring Program activities at "methane wells" in or near the site landfill, the combustible gas indicator (CGI) will be utilized to measure the presence of explosive gases in the well casing and breathing zone The CGI measures percent oxygen and percent of lower explosive limit (LEL) of explosive gases, relative to a methane gas calibration standard The presence of explosive gases in excess of 25% of the LEL will require field crews to allow the well to vent, to ensure that all equipment utilized in the immediate vicinity of the well is intrinsically safe, and that no potential ignition sources are located near the well

It should be noted that oxygen-deficient atmospheres, such as those potentially encountered in the "methane wells," may adversely affect the performance of the CGI Accordingly, the percent of oxygen concentration in the well should be measured prior to measurement of explosive gas concentrations Oxygen concentrations less than 19 5% may render LEL readings invalid

Intrusive tasks conducted at the "methane wells" are to be conducted only when local wind speed exceeds 15 miles per hour Field crews will measure local wind speed with a hand-held anemometer when conducting activities at "methane wells " If local wind speed drops below 15 miles per hour, work at that site will be terminated and resume only when the minimum threshold is reached Only intrinsically safe instruments will be used in the methane wells A PID and CGI will be utilized to monitor air quality in the "methane wells" and the worker breathing zones

7 4 Personal Protective Equipment

Personal Protective Equipment (PPE) comprises the "last line of defense" against health hazards, following engineering controls and good work practices Engineering controls are not applicable to intrusive activities conducted as part of the Groundwater Monitoring Program Good work practices are identified in appropriate SOP GWs and FOs PPE for Groundwater Monitoring Program activities consists of clothing to protect the workers from physical, radiological, or chemical hazards, and respiratory protection to reduce or eliminate the potential for inhalation of hazardous substances

The following subsections describe general PPE clothing and respirator requirements for Groundwater Monitoring Program operations PPE ensembles (complementary clothing and respirator requirements) are outlined in Section 7 4 3 PPE requirements for Groundwater Monitoring Program tasks are provided in Section 7 5

7.4.1 Clothing

PPE clothing consists of items designed to protect the worker from physical, radiological, and chemical hazards The basic field work uniform consists of Department of Energy (DOE) cotton coveralls, ANSI-approved (Z41-1991) safety over-the-ankle boots or shoes, and safety glasses Cotton surgical "scrubs" may be worn as an alternative to DOEs A personal radiation dosimetry badge will be worn when conducting any radiological activities in which the RWP or radiological posting requires dosimeter Hard hats are to be worn in situations presenting a potential hazard from falling objects, and leather gloves may be warranted for activities with the potential for cuts or puncture wounds to the hands Nitrile gloves will be worn where potential chemicals or radiological hazards may exist

Upgrading the basic uniform will provide additional protection from dust and liquid hazards Disposable chemical-resistant coveralls, such as Tyvek^{tm} or equivalent, protect the worker from skin contact with airborne contaminants If a splash hazard is present, the coveralls may be further upgraded to a coated material such as Saranex^{tm} or equivalent Alternatively, splash protection may be afforded by wearing an apron

Hand, foot, and face protection may be similarly upgraded Surgical rubber inner gloves, possibly combined with nitrile or butyl outer gloves, provide hand protection from dust or liquid chemical hazards Foot protection may be upgraded with chemical-resistant boots or booties The face may be protected from splash hazards by a face shield or a full-face respirator

It should be noted that coverall sleeves and legs will be worn over or under the cuffs of gloves and boots depending on the specific hazard presented by a given task If a splash hazard exists, sleeves and pant legs will be worn outside gloves and boot covers If a dust hazard is present, the coverall sleeves and pant legs will be worn inside glove cuffs and boot covers Tape will be used to seal the joints between coveralls, protective gloves, and cuffs

7.4.2 Respirators

Respirators provide workers with protection from the inhalation of hazardous substances Respiratory protection at the RFETS includes full-face air-purifying respirators (APR), and self-contained breathing apparatus (SCBA) or supplied-air line with escape SCBA For Groundwater Monitoring Program operations, respiratory protection is generally not necessary unless air monitoring, as described above, indicates that respiratory protection is required A full-face respirator with organic vapor/acid gas and radionuclide cartridges will be utilized if air monitoring indicates that action levels for compounds of concern (listed in Table 7-2) are exceeded

APRs will be maintained in accordance with an Rocky Flats-approved Respiratory Protection Program maintenance schedule Respirators will be inspected on a semi-annual basis at a minimum If used as part of an Emergency Response program, respirators will be inspected on a monthly basis at a minimum The respirators shall be stored properly in a sealed plastic bag, face-down, and not stacked

Before being taken in the field, each APR will be inspected, appropriate cartridges installed, a positive and negative pressure check conducted, and the entire APR assembly will be sealed in a plastic bag The APR will remain in the sealed bag until needed If the APR is not used and the

sealed bag is not damaged, the respirator may remain at the work site inside an area protected from weather The enclosed cab of a vehicle is considered to be one example of a protected area

After the APR has been used, the following cleaning and maintenance procedures will be followed

- Cartridges from the APR will be removed and disposed of as contaminated PPE daily when monitoring indicates that the cartridges were used in an atmosphere having concentrations of contaminants above Permissible Exposure Limits (PELs), and weekly when cartridges were used in an atmospheres having concentrations below PELs

- The APR interior and exterior will be wipe-tested for radioisotopes before being cleaned if radioactivity was detected while the APR was being used or whenever crew members exit on Radiological area If the wipe test indicates the presence of radioactivity, ROI-2 02 and -2 04 will be consulted for appropriate procedures to be utilized in response to potential inhalation of radioactive materials

- For APRs not exposed to radiological contamination, the APR face-piece interior and exterior will be wiped down with pre-moistened towellettes and subsequently sealed in a plastic bag for transport to the APR cleaning station at the shower trailer, and,

- After the APR has been cleaned and rinsed, it will be dried with a clean towel and stored in a clean, sealed plastic bag

7.4.2.1 Respiratory Protection Program

Personnel performing tasks which require respiratory protection will be trained and fitted for respirators in accordance with an Rocky Flats-approved Respiratory Protection Program Subcontractors may either submit their own Respiratory Protection Programs for Rocky Flats approval or comply with the Rocky Flats Respiratory Protection Program provided in HSP 1-G2200-HSP-7 03 Subcontractors are responsible for ensuring that their employees comply with their respiratory program Each individual is responsible for the cleaning, inspection, maintenance, and storage of any APR they use

7.4.2.2 Respirator Decision Logic

The decision to wear respiratory protection is based on the potential for hazardous constituents to be present in the breathing zone of the worker Situations with a known potential for the presence of such constituents, such as intrusive activities at wells with a previous history of compound of concern concentrations above permissible exposure limits in the breathing zone, require respiratory protection while conducting real-time monitoring with an PID Other situations, such as intrusive activities at wells which have not yet been characterized by an analytical laboratory and are in locations reasonably anticipated to high concentrations of compounds of concern, have an unknown potential for the presence of airborne hazardous constituents and may require respiratory protection Finally, some situations have no potential for the presence of airborne hazardous constituents and require no respiratory protection Situations with no potential for the presence of airborne hazardous constituents include well casing head-space and breathing zone analysis for wells with no history or reasonable likelihood of contamination, such as those located in the Buffer Zone

Each of these situations requires a different response by the field worker The field worker, in conjunction with the HSS, will utilize the monitoring strategies presented in Section 7 3 to determine appropriate respiratory protection

Historical data detailing air monitoring results for well casing and breathing zone surveys are provided in Appendix E These data will be utilized during pre-sampling planning to determine appropriate respiratory protection levels for each sampling location

The data provided in Appendix E were obtained by air monitoring with a PID In accordance with the action levels presented in Table 7-2, any well listed as exhibiting PID readings above background should be approached from upwind while monitoring air quality with colormetric detector tubes, following procedures outlined in Section 7 3 2 2

7.4.2.3 Respirator Action Levels

Real-time air monitoring, as described in Section 7 3, will provide field workers with information necessary to determine appropriate respiratory protection Certain threshold values have been established for particular compounds, the exceedance of these values requires a specific action Accordingly, these values are termed "action levels " Action levels have been set requiring the upgrade from no respiratory protection (Level D and Modified Level D) to APRs (Level C)

Action levels for radioisotopes are defined in ROI-3 01 and -3 02, action levels for organic compounds have been set at one half of the permissible exposure limits (PELs) for specific compounds as set by OSHA

PIDs respond to various compounds according to the calibration standard for the instrument, the power of the instrument, and the ionization potential of the compound Because PIDs provide only a qualitative measure of the presence of volatile organic compounds, action levels for PID instrument use have been set at any reading in the breathing zone above background The required action when this level is attained is to relocate upwind of the source, allow the well to vent, contact the HSS, and, if requested, conduct colormetric detector tube monitoring Colormetric detector tubes provide quantitative data about concentrations of particular compounds of concern Action levels for volatile organic compounds of concern are provided in Table 7-2

7.4.3 Personal Protective Equipment Ensembles

PPE ensembles consist of certain clothing and respiratory protection elements which, in combination, protect the wearer against certain physical, radiological, and chemical hazards Established PPE ensembles are summarized below, it should be noted that each ensemble may be modified slightly by task-specific requirements to address particular hazards associated with that task Task-specific PPE requirements are provided in Section 7 5 and summarized in Table 7-3

7.4.3.1 Level D

Level D PPE is worn while performing tasks with little or no potential for exposure to contaminants It is the basic work uniform

Level D PPE consists of

- RFETS-provided Department of Energy (DOE) cotton coveralls, to be changed daily,
- ANSI (Z41-1991) approved over-the-ankle safety boots or shoes,
- Safety glasses with side shields or equivalent,
- Additional seasonal items, as necessary,
- Leather gloves (when handling sharp objects), and,
- Hard hat if an overhead hazard is present

It should be noted that if a dust hazard is present in a radiological area, and the RWP does not cover this problem, work will stop The HSS will contact Rad Engineering, RMRS Health and Safety, and the Groundwater Field Manager, who will in turn contact the RMRS vice president or his/her designee to resolve this issue

7.4.3.2 Modified Level D

Modified Level D PPE represents an upgrade of Level D PPE to address possible skin contact with contaminants Modified Level D PPE is to be worn when conducting tasks with the potential for splash or dust exposure to hazardous constituents, but when no respiratory protection is necessary

Modified Level D PPE consists of Level D PPE and the following additional items

- Disposable chemical-resistant gloves (nitrile or equivalent),
- ANSI (Z41-1991) approved over-the-ankle safety boots or shoes
- Uncoated chemical-resistant disposable coveralls (Tyvek^{tm} or equivalent) or coated chemical-resistant disposable coveralls (Saranex^{tm} or equivalent),
- Coverall sleeves and legs will be worn over or under the cuffs of gloves and boots depending on the specific hazard presented by a given task If a splash hazard exists, sleeves and pant legs will be worn outside gloves and boot covers If a dust hazard is present, the coverall sleeves and pant legs will be worn inside glove cuffs and boot covers Tape will be used to seal the joints between coveralls, protective gloves, and cuffs, and,
- Additional seasonal items, as necessary Any such items will be worn under the disposable coverall

It should be noted that if a dust hazard is present in a radiological area, and the RWP does not cover this problem, work will pause while the HSS contacts Rad Engineering, RMRS Health and Safety, and the RMRS ER Site Manager, who will in turn contact the RMRS vice president or his/her designee to resolve this issue

7.4.3.3 Level C

Level C PPE provides protection from contaminants by using chemical-resistant coveralls and respiratory protection Level C PPE is to be worn when conducting operations with the potential for exposure to airborne hazardous constituents requiring respiratory protection

Level C PPE consists of

- RFETS-supplied DOE cotton coveralls to be changed daily,
- Uncoated chemical-resistant disposable coveralls (Tyvek^{tm} or equivalent), or coated chemical-resistant disposable coveralls (Saranex^{tm} or equivalent),

- Coverall sleeves and legs will be worn over or under the cuffs of gloves and boots depending on the specific hazard presented by a given task If a splash hazard exists, sleeves and pant legs will be worn outside gloves and boot covers If a dust hazard is present, the coverall sleeves and pant legs will be worn inside glove cuffs and boot covers Tape will be used to seal the joints between coveralls, protective gloves, and cuffs,

- Disposable chemical resistant inner gloves (as necessary),

- Butyl or nitrile outer gloves,

- ANSI (Z41-1991) approved over-the-ankle safety boots or shoes,

- Full-face APR with appropriate high-efficiency particulate air (HEPA) cartridges that provide protection against organic vapors, acid gases, and radioisotopes, and,

- Additional seasonal items, as necessary Any such items will be worn under the disposable coverall

7.5 Required Levels of Personal Protective Equipment Per Task

Tasks performed at or associated with Groundwater Monitoring Program activities are conducted in accordance with appropriate SOP GWs and FOs A listing of SOP GWs and FOs relevant to Groundwater Monitoring Program operations is provided in Table 7-3 Any task performed by the subcontractor not listed in Table 7-3 may be considered a special circumstance and require consultation with the HSO and RFETS PM to identify health and safety issues associated with the task As described in Section 7 5 23, special circumstances will require preparation of a task-specific Health and Safety Plan by the subcontractor HSO

This section briefly outlines activities associated with each task, and identifies PPE requirements to perform those activities PPE requirements for each task are also presented in Table 7-3 In all cases where air monitoring is required, the monitoring strategies provided in Section 7 3 will be utilized prior to initiation of intrusive activities Additionally, in all cases where intrusive activities involving designated "methane" wells, the monitoring strategies provided in Section 7 3 2 3 will be followed

7.5.1 SOP GW.1: Water Level Measurements in Wells and Piezometers

Task Description

The Groundwater Monitoring Program subcontractor conducts water level measurements in site monitoring wells and piezometers on a scheduled basis Air monitoring is conducted prior to water level measurement Water level measurement consists of placing an electronic water level probe in the well and recording the depth to water based on an audible alarm which sounds when the probe contacts the water surface The measurement is recorded on the appropriate field data form

Refer to Section 7 3 2 3 for information on conducting water level measurements in "methane" wells

PPE Requirements

Refer to Section 7 3 2 for air monitoring PPE requirements

In general, performing this task requires the use of Level D PPE with nitrile or butyl gloves Consult the radiation work permit (RWP) for PPE requirements when conducting in water level measurements in wells or piezometers in Radiological Areas or any other areas with known radiological contamination, such as IHSSs

7.5.2 SOP GW.2: Well Development

Task Description

Well development is undertaken on new wells to remove drilling fluids and mobile particulates, and on old wells to remove sediment, from the water column in the well Water level measurement in accordance with SOP GW 1 is performed, and groundwater is evacuated from the well using a bailer or inertial pump Recovered characterized groundwater is retained in a graduated container to measure quantity, transferred to a marked tank in the field vehicle, and transported to the Main Decontamination Facility (MDF) for disposal If the well is uncharacterized or known to be contaminated, recovered groundwater should be transferred to a separate marked trailer tank

Refer to Section 7 3 2 3 when conducting well development in "methane" wells

PPE Requirements

Refer to Section 7 3 2 for air monitoring PPE requirements

In general, Level D PPE with nitrile or butyl gloves will be worn when conducting well development activities Ear protection will be worn when working near an operating gas generator Consult the radiation work permit (RWP) for PPE requirements when conducting well development in Radiological Areas or any other areas with known radiological contamination

7.5.3 SOP GW.3: Pump-in Borehole Packer Testing

Task Description

Pump-in borehole packer testing is occasionally utilized at the Rocky Flats Environmental Technology Site to evaluate aquifer characteristics such as hydraulic conductivity Associated tasks include SOP GW 1 Three types of packer tests are used constant head, constant rate of flow, and pressure pulse tests Each of these tests require placing the packer in an open borehole, inflating the packer, and monitoring measurements of water levels or pressure differentials as stress is induced on a portion of the borehole

Refer to Section 7 3 2 3 when conducting packer testing in "methane" wells

PPE Requirements

Refer to Section 7 3 2 for air monitoring PPE requirements

In general, PPE appropriate for conducting pump-in borehole packer testing consists of Level D with nitrile or butyl gloves Ear plugs will be worn when working near an operating gas generator Consult the radiation work permit (RWP) for PPE requirements when conducting pump-in borehole packer tests in Radiological Areas or any other areas with known radiological contamination

7.5.4 SOP GW.4: Slug Tests

Task Description

Slug tests are occasionally performed in site monitoring wells and piezometers to measure the rate of water level recovery in the well Associated tasks include SOP GW 1 The procedure involves the introduction of a solid slug into the standing water column in the well while simultaneously measuring water levels during the period of recovery to static conditions

Refer to Section 7 3 2 3 when conducting slug tests in "methane" wells

PPE Requirements

Refer to Section 7 3 2 for air monitoring PPE requirements

In general, slug tests will be performed in Level D PPE with the addition of nitrile or butyl gloves Consult the radiation work permit (RWP) for PPE requirements when conducting slug tests in Radiological Areas or any other areas with known radiological contamination

7.5.5 SOP GW.5: Field Measurement of Groundwater Field Parameters

Task Description

Field crews are required to measure certain chemical and physical characteristics of groundwater during well development and purge activities Associated tasks include SOP GW 1 and SOP GW 2 These characteristics include temperature, pH, specific conductance, nitrate, and turbidity Field crews measure these parameters at established volumetric intervals using field instruments such as the Hach DR2000 Spectrophotometer (or equivalent)

Refer to Section 7 3 2 3 when conducting field measurement of groundwater field parameters in "methane" wells

PPE Requirements

Refer to Section 7 3 2 for air monitoring PPE requirements

In general, field measurement of groundwater field parameters shall be conducted in Level D PPE including the use of nitrile gloves Ear plugs will be worn when working near an operating gas generator Consult the radiation work permit (RWP) for PPE requirements when conducting field measurement of groundwater field parameters in Radiological Areas or any other areas with known radiological contamination

7.5.6 SOP GW.6: Groundwater Sampling

Task Description

Groundwater sampling is the primary task of the Groundwater Monitoring Program subcontractor Associated tasks include SOP GW 1, SOP GW 2, and SOP GW 5 The wells are purged and samples collected with bailers and a hand reel system

Refer to Section 7 3 2 3 when conducting groundwater sampling in "methane" wells

PPE Requirements

Refer to Section 7 3 2 for air monitoring PPE requirements

In general, groundwater sampling will be conducted in Level D PPE with the addition of nitrile or butyl gloves Ear plugs will be worn when working near an operating gas generator Consult the radiation work permit (RWP) for PPE requirements when conducting groundwater sampling in Radiological Areas or any other areas with known radiological contamination

7 5.7 *SOP GW.8: Aquifer Pumping Tests*

Task Description

Step-drawdown and constant rate discharge pumping tests are performed in well points and completed wells Aquifer pumping tests are performed by pumping wells at fractions of full capacity while varying pumping rates in a time step fashion, and/or pumping at a constant rate Water levels are simultaneously measured in the production well or nearby observation wells Water level measurements are conducted in accordance with SOP GW 1

Refer to Section 7 3 2 3 when conducting aquifer pumping tests in "methane" wells

PPE Requirements

Refer to Section 7 3 2 for air monitoring PPE requirements

In general, aquifer pumping tests will be conducted in Level D PPE with the addition of nitrile or butyl gloves Ear plugs will be worn when working near an operating gas generator Consult the radiation work permit (RWP) for PPE requirements when conducting aquifer pumping tests in Radiological Areas or any other areas with known radiological contamination

7.5.8 SOP FO.01: Air Monitoring and Dust Control

Task Description

Air monitoring and dust control activities are generally not conducted by the Groundwater Monitoring Program subcontractor However, intrusive activities conducted at "methane wells" in the vicinity of the site landfill are to be conducted only when wind velocity exceeds 14 miles per hour A hand-held anemometer will be utilized by field crews to verify wind speed prior to conducting intrusive activities at these locations

PPE Requirements

At a minimum, Level D PPE is required for this task

7.5.9 SOP FO.02: Transmittal of Field QA Records

Task Description

Field QA records must be properly completed, authenticated, and provided with a unique identification number A package of QA records is to be transmitted to the responsible project manager at least once every seven days This task is conducted in the subcontractor Base Laboratory

PPE Requirements

At a minimum, Level D PPE is required for this task

7.5.10 SOP FO.03: General Equipment Decontamination

Task Description

General equipment decontaminated in the field and at the Main Decontamination Facility (MDF) consists of sampling and monitoring equipment utilized by the field crews Decontamination activities will be conducted in accordance with the Decontamination Facility HASP Procedures to conduct equipment decontamination depend upon the specific piece of equipment, the location in which the equipment was used, and the location where the decontamination activity is conducted

Procedures to conduct general equipment decontamination include the following steps

- Prior to arriving at the MDF, the user will conduct a pre-decontamination radiological survey for alpha, beta, and gamma contamination, including an equipment frisk and a smear sample for removable contamination Additionally, the user will conduct an organic vapor monitoring survey with an Organic Vapor Detector,

- Survey results will be reviewed by the Decontamination Facility Subcontractor (DFSC) and user HSSs for elevated levels of contamination (above ROI-3 02 guidelines for radiological parameters or above action levels provided in Table 7-2 for organic vapors) RE and/or IH will be notified if elevated levels are identified,

- If the equipment to be decontaminated originates in a Radiological Area and is above ROI-3 02 limits, an RWP will be developed and the MDF will be posted as per RWP during decontamination activities If the equipment does not originate from a Radiological Area or if below ROI-3 02 limits, no special posting is required unless directed by RE,

- Following acceptance of survey results, the equipment will be decontaminated by the user, using the pressurized steam cleaner General procedures for equipment decontamination require removal of residual contaminants, placement of the equipment on the wash rack with open end down (if applicable), and standing upwind or cross-wind of the equipment while using the steam cleaner The equipment is to be placed in a clean area to air dry, or the equipment is dried using disposable towels,

- The DFSC or user HSS will conduct a post-decontamination radiological survey of the equipment if radiological contamination was detected prior to decontamination, and,

- The DFSC or user HSS will conduct a post-decontamination radiological survey of the MDF if the MDF was posted as a Radiological Area or radiological contamination was detected on equipment prior to decontamination, and provide the results to the DFSC HSS

PPE Requirements

In general, PPE required for field decontamination consists of Level D with the addition of nitrile or butyl gloves Consult the radiation work permit (RWP) for PPE requirements when conducting field general equipment decontamination in Radiological Areas or any other areas with known radiological contamination

For decontamination activities at the MDF, PPE utilized to conduct the pre- and post-decontamination radiological surveys consists of Level D If the radiological frisk identifies contamination above ROI-3 01 and -3 02 limits, the survey will be temporarily discontinued and the MDF posted as a Radiological Area Level C PPE will be donned and the survey completed

PPE utilized while performing decontamination activities at the MDF is comprised of Modified Level D, with coated disposable chemical-resistant coveralls such as Saranex™ or equivalent Additionally, a face-shield and nitrile or butyl gloves will be worn PPE may be upgraded to Level C if the MDF is designated as a Radiological Area, as per RWP

7.5.11 SOP FO.05: Handling of Purge and Development Water

Task Description

Purge and development water originating from groundwater monitoring wells is collected in buckets during purge and development activities at each well Water is transferred to a holding tank in the field vehicle or the field vehicle trailer, and transported to the MDF for disposal in the MDF sedimentation tanks or stored for other approved disposal of uncharacterized or contaminated water The water is transferred into the sedimentation tanks by the field crew and the MDF subcontractor through a pump and purge hose

PPE Requirements

Refer to Section 7 3 2 for air monitoring PPE requirements

In general, PPE requirements for collection of purge and development water at each well location consists of Level D PPE Consult the radiation work permit (RWP) for PPE requirements when handling purge and development water in Radiological Areas or any other areas with known radiological contamination

PPE requirements for purge and development water transfer operations is comprised of Level D PPE with the addition of ear plugs (when using a gasoline-powered pump), nitrile or butyl gloves, and a splash apron

7.5.12 SOP FO.06: Handling Personal Protective Equipment

Task Description

PPE generated from Groundwater Monitoring Program operations is disposed of at the subcontractor Base Laboratory PPE disposal requirements vary according to whether the PPE is radiologically contaminated or not When the container is full, the subcontractor HSS will conduct Rad survey of the PPE If the PPE is identified as contaminated or potentially contaminated, RE will be notified and the subcontractor will dispose of the PPE according to RE guidelines If the results of the Rad survey indicate that the PPE is not radiologically contaminated, the PPE will be disposed of as uncontaminated material Disposal for uncontaminated PPE consists of placing the PPE in double plastic bags, sealing the bags, labeling them as uncontaminated PPE, and transferring the PPE to Rocky Flats Environmental Operations Personnel

PPE Requirements

PPE to be utilized for handling used PPE consists of Level D with nitrile or butyl gloves

7.5.13 SOP FO.07: Handling of Decontamination Water and Wash Water

Task Description

Water generated from decontamination and wash activities is disposed of at the MDF Water may be generated from field activities or from MDF pad activities The water flows to or is placed in the MDF sump, and is pumped through the separators to Sedimentation Tank 1 Subsequent handling of decontamination water and wash water is conducted by the MDF operator

PPE Requirements

PPE required for handling decontamination and wash water consists of Level D with the addition of ear plugs (when using a gasoline-powered pump), nitrile or butyl gloves, and a splash apron Consult the radiation work permit (RWP) for PPE requirements when handling decontamination water or wash water in RAs or any other areas with known radiological contamination

7.5.14 SOP FO.11: Field Communications

Task Description

Field crews will utilize the buddy system, and radio communication is required Knowledge of audible alarms, as described in Section 8 4, is required Hand signals may be appropriate in high noise situations LS/DW (Life Safety/Disaster Warning) announcements will be relayed via radio to field crews by their supervisor

PPE Requirements

At a minimum, Level D (standard work uniform) will be worn when conducting field communications

7.5.15 SOP FO.12: Decontamination Facility Operations

Task Description

General equipment and heavy equipment decontamination activities not conducted in the field are performed at the Main Decontamination Facility (MDF) or Protected Area Decontamination Facility (PADF) Decontamination operations at either facility require pre- and post-decontamination radiological surveys by an HSS Decontamination operations will be performed in accordance with FO 3 and FO 4 requirements, and in accordance with the requirements of the Decontamination Facility HASP and RWP

PPE Requirements

PPE requirements for Groundwater Monitoring Program personnel conducting FO 12 tasks includes Level D clothing with butyl or nitrile gloves, and ear plugs If actual decontamination activities requiring the use of the steam cleaner will be performed, Modified Level D PPE is required Respiratory protection will be upgraded according to RWP requirements if the Decontamination Facility is designated as a Radiological Area

7.5.16 SOP FO.13: Containerization, Preserving, Handling and Shipping of Soil and Water Samples

Task Description

Groundwater samples are preserved by the placement of liquid preservatives in the bottles prior to sample collection Placement of the preservative is performed in the subcontractor preservative room laboratory under a laboratory vent-hood that vents to the outside A pipette is used to place the preservative in the bottle

Groundwater samples collected from monitoring wells are shipped to analytical laboratories for analysis Samples are collected from the monitoring wells, placed in appropriate sample bottles, and the bottles are placed in a shipping cooler The exteriors of the bottles and the shipping cooler are surveyed for radiological contamination when leaving RAs and for P/WRE requirements Sample bottle and cooler handling includes a direct frisk and swipe sample radiological survey for alpha, beta, and gamma contamination as required above The sample bottles and coolers are decontaminated as necessary, the bottles are placed in sealed plastic bags, and shipped in a sealed cooler Water used for decontaminating bottle and cooler exteriors is disposed in the MDF sump At no time will sample bottles or coolers be shipped prior to the HSS determination, through radiological survey, that ROI-3 01 and -3 02 have been complied with The HSS and Sample Manager shall insure the P/WRE, screening and survey requirements have been satisfied prior to off-site shipment of environmental samples

Shipping requirements for soil and water samples includes preparation of appropriate paperwork and assurance that the shipment is in compliance with relevant DOT shipping regulations

PPE Requirements

In general, water sample containerizing and handling will be conducted in Level D PPE with nitrile or butyl gloves Refer to Section 7 5 6, "SOP GW 6 Groundwater Sampling," for additional details on PPE requirements when containerizing and handling water samples

Sample preservation PPE requirements consist of Level D with nitrile or butyl gloves, a splash apron, and a face-shield

At a minimum, Level D PPE is required when shipping sample containers

7.5.17 SOP FO.14: Field Data Management

Task Description

Field data management is comprised of data entry into the Rocky Flats Environmental Data System (RFEDS) This task is an office activity conducted by the subcontractor

PPE Requirements

An office work uniform is appropriate for this task, no special PPE is required

7.5.18 SOP FO.15: Photoionization Detectors (PID) and Flame Ionization Detectors (FID)

Task Description

Photoionization Detectors (PIDs) are used by the Groundwater Monitoring Program subcontractor when conducting well casing headspace analysis prior to water level measurement, well development, or sample collection Specific monitoring strategies for these instruments are described in Section 7 3 2

PPE Requirements

Refer to Section 7 3 2 for air monitoring PPE requirements

PPE required to perform PID monitoring generally consists of Level D during monitoring prior to sampling Refer to task-specific descriptions for PPE requirements during PID monitoring

7.5.19 SOP FO.16: Field Radiological Measurements

Task Description

Field radiological measurements are performed by RCTs or the subcontractor HSS Measurements include collection and survey of smear samples, as well as field frisks of personnel and equipment The results of the surveys are typically compared to ROI-3 01 and -3 02 release criteria

PPE Requirements

In general, PPE requirements for conducting field radiological measurements consists of Level D with nitrile or butyl gloves Consult the radiation work permit (RWP) for PPE requirements when conducting field radiological measurements in Radiological Areas or any other areas with known radiological contamination

7.5.20 SOP FO.18: Environmental Sample Radioactivity Content Screening

Task Description

Environmental sample radioactivity content screening is conducted on sample containers and sample coolers by the subcontractor HSS prior to shipment to analytical laboratories

PPE Requirements

In general, PPE requirements for conducting environmental sample radioactivity content screening consists of Level D with nitrile or butyl gloves

7.5.21 SOP FO.19: Base Laboratory Work

Task Description

Base Laboratory work is conducted at the subcontractor trailer and consists of staging equipment for sampling activities, storing and preparing sample containers and sample sets, receiving, preparing, and shipping samples, and equipment storing and calibration

PPE Requirements

Base Laboratory work will be conducted in Level D PPE

7.5.22 SOP FO.25: Shipment of Radioactive Materials Samples

Task Description

Radioactive materials samples are shipped to analytical laboratories for analysis Samples are shipped after appropriate survey and decontamination, if necessary, as described in Section 7 5 20

PPE Requirements

At a minimum, Level D PPE will be worn by personnel conducting FO 25 tasks

7.5.23 Special Tasks Conducted by the Groundwater Monitoring Program Subcontractor

Task Description

The Groundwater Monitoring Program subcontractor may be required by Rocky Flats to perform tasks which are not specifically provided for in the GW SOPs and FOs listed above In the event that the subcontractor is requested to perform "out of scope" tasks, the individual requesting performance of the task will complete a Health and Safety information form for the subcontractor A Special Task Health and Safety Plan will be prepared by the subcontractor Health and Safety Officer The information form and Special Task Health and Safety Plan are provided in Appendix F

PPE Requirements

Refer to Section 7 3 2 for air monitoring PPE requirements

The specific risks associated with each task must be assessed based on information provided by the requestor, and appropriate PPE selected by the HSO in consultation with the Project Manager, if necessary

8.0 EMERGENCY RESPONSE PROCEDURES

8 1 Radio Communications

Field teams will have a method of communicating with both the field office trailer and other field teams Radio communications are required Each field crew will be issued a radio for communication with the subcontractor Base Laboratory trailer office Field crews will be required to utilize assigned open channel radio frequencies, and "check in" with the subcontractor office at least every two hours The Base Laboratory will utilize the radios to relay messages, such as LS/DW announcements, to field crews For after-daylight hours work, the HSS will serve as the check in contact The HSS Location will alternate between the Base Laboratory and the work site

8.2 Emergency Telephone

Emergency help is accessed by any RFETS phone or field radios The closest accessible telephone during all work hours will be identified by the HSS before beginning field activities in case radio communication with the communication center is not possible All RFETS guard posts have telephones

The subcontractor Base Laboratory trailer office will be equipped with telephone communications and shall be attended at all times during operations Emergency telephone numbers, as listed below and in Table 8-1, are posted near the office telephones and at the office entrances

Site Health and Safety Officer	(303) 966-4953
Shift Superintendent	(303) 966-2914
Fire	(303) 966-2911
Ambulance	(303) 966-2911
Poison Center	(303) 629-1123
Security	(303) 966-3347
Medical Facility General Information	(303) 966-2594
NEAREST MEDICAL SERVICES ARE LOCATED AT	Building 122

8.3 Medical Facilities

The RFETS Medical Facility provides emergency care and ambulance service for on-site incidents Monday through Thursday from 6 30 a m to 8 00 p m , and on Friday from 6 30 a m to 4 00 p m The Medical Facility is closed Saturday and Sunday When the Medical Facility is closed, medical emergency coverage is provided by the Fire Department Telephone numbers for the RFETS Medical Facility are provided below

- General Information 966-2594
- Ambulance Service 966-2911
- Emergency Telephone 966-2911
- Fire/Explosion 966-2911

Directions to the Medical Facility (Building 122, Central Avenue, Figure 8-1) are as follows

From the Contractors' trailer compound, take a northbound street to Central Avenue and turn left onto Central Avenue Building 122 will be on the left side and slightly west of a guard building on the right after approximately 1 25 miles

From the RFETS eastern boundary, upon entering RFETS from Indiana Street, you will be on Central Avenue Proceed approximately 3 5 miles Building 122 will be on the left side

From the RFETS western boundary at Hwy 93, proceed along the entrance road to just past the gate, at which time you will be eastbound on Cactus Avenue Then turn left onto the first street past Second Street, (Third Street, which is not marked) Proceed up Third Street past Building 125, which is on the left the next building on the left will be the medical facility (Building 122)

8.4 Emergency Response Procedures

The On-site Project Manager, with assistance from the SSO, has responsibility and authority for coordinating all emergency response activities until proper authorities arrive and assume control

The subcontractor will develop an Emergency Response Exercise program, submitted to the Project Manager and Environmental Restoration Health and Safety Officer for approval, in order to practice Emergency Response procedures prior to an actual emergency At a minimum, the Emergency Response Exercise should involve a reasonable emergency scenario that requires actions in the following areas

- Emergency recognition,
- Safe distance and place of refuge (assembly area) designation,
- Site security and control,
- Evacuation routes,
- Emergency treatment and first aid,
- Personnel and equipment decontamination,
- Emergency communication,

- PPE and emergency equipment uses, and,
- A follow-up meeting to discuss effectiveness of the exercise and recommended actions

The exercise will be conducted at a minimum frequency of every 6 months

Audible emergency alarms are used at Rocky Flats to alert personnel of specific emergencies A list of the specific warnings, associated sound, and instructions for response, is provided in Table 8-2

8.4.1 Fire/Explosion

Fire emergencies will be handled by immediately notifying the fire department (**2911**) Only if a fire appears to be small and easily extinguishable will personnel attempt to control it with fire extinguishers available in the work area Otherwise, immediate evacuation of the area is required In the event of an explosion, all personnel shall be evacuated and the fire department notified No one shall re-enter the area until re-entry has been cleared by the fire department

8.4.2 Physical Injury

In case of injuries to personnel, the SSO will be notified first, then first aid treatment will be initiated immediately by trained personnel In case of serious injuries, the SSO/base lab shall call **2911** As groundwater sites are often in remote areas, the emergency personnel may respond faster by coming to the base lab and getting a knowledgeable escort All serious injuries (e g , snake bites) will be transported by RFETS Emergency response personnel and vehicles Minor injuries may be treated on site (first aid), but all injuries will be evaluated by RFETS medical personnel In the event the injured person is contaminated with chemicals or radionuclides, decontamination will be performed to prevent further exposure only if it will not further aggravate the injury

8.4.3 Injury Due to Heat

If a person is suffering from heat exhaustion (profuse perspiration, normal body temperature), the following procedures will be taken

- Remove the person to a cooler, shaded area,
- Give 8 ounces of Gatorade (if available) every 15 minutes for three or four doses Drinking water will be used if Gatorade™ is not readily available,
- Allow the person to rest, and,
- If the person is suffering from cramps, press warm, wet towels over the cramped area

A **life threatening** situation exists and **immediate action** is indicated if a person is suffering from **heat stroke** (skin hot and dry, very high body temperature), the following procedures will be taken

- **Immediately** contact the HSS and request that medical facility personnel be contacted and respond to the accident location, and take instructions from the medical personnel for care of the victim until their arrival,
- Cool the victim quickly by soaking the person in cool (but not cold) water, sponging the body with rubbing alcohol or cool water, or pouring water on the body, and,
- Transport to hospital for medical attention as quickly as possible

8.4.4 Injury Due to Cold

First aid for frostbite consists of the following procedures

- Notify the On-site Project Manager or HSS, and RFETS Occupational Medicine (OM),
- Bring the victim indoors and quickly rewarm the affected areas in water between 102° to 105°F,

- Give victim a warm drink--NOT coffee, tea, or alcohol,
- Do not permit the victim to smoke,
- Keep the frozen parts in warm water or covered with warm cloths for 30 minutes, even though the tissue will be painful as it thaws,
- Evaluate the injured areas and cover with sterile, soft, dry material,
- Keep the victim warm and get immediate medical care,
- Do not rub the frostbitten part,
- Do not allow blisters to be broken,
- Do not use ice, snow, or anything cold on frostbite,
- Do not use heat lamps or hot water bottles to rewarm the body part, and,
- Do not place the affected part near a hot stove
- Decontaminate the victim only after the frostbite situation is rectified and initiation of decontamination is approved by a physician

First aid for excessive exposure to cold (hypothermia) consists of the following procedures

- Contact SSO, who will call paramedics (**2911**) so victim can be moved safely and quickly,
- Bring victim into a warm area as quickly as possible,
- Remove wet or cold garments,
- Dry the person thoroughly,
- Provide warm, dry clothing or covering,
- Provide rapid but gentle rewarming,
- Give victim a warm drink--NOT coffee, tea, or alcohol,
- Keep the victim warm, and,

- Decontaminate the victim only after the (hypothermia) situation is rectified and initiation of decontamination is approved by a physician

8.4.5 Reporting and Notification

Reporting and notification of emergency situations shall be carried out in accordance with Chain of Command requirements in Department of Energy (DOE) Order 5484 1 In the event of an emergency, a crew member of the field team involved will notify the Site Safety Officer who will notify the appropriate emergency assistance personnel (for example, fire, police, ambulance) at extension **2911** immediately, and then notify the Site Manager The Site Manager will notify the Rocky Flats Environmental Restoration (ER) Program Field Supervisor, PM, and Health and Safety Administrator The responsibility of the SSO is to implement notification and reporting requirements of DOE Order 5484 1

8.4.6 Thunderstorms and Tornadoes

A severe thunderstorm watch or a tornado watch announcement on radio or television indicates that a severe thunderstorm or tornado is possible Work will continue at the work site during severe thunderstorm watches or tornado watches A severe thunderstorm warning or a tornado warning signifies that a severe thunderstorm or a tornado has been sighted or detected by radar and may be approaching All work on site shall cease during a thunderstorm, severe thunderstorm warning, or tornado warning

Personnel on site during a tornado shall take the following steps

- Evacuate office trailers or vehicles,
- If outdoors, lie flat in a nearby ditch,
- Stay away from power poles, electrical appliances, and metal objects, and,
- Do not try to outrun a tornado

8.4.7 Other Adverse Weather

In the event of adverse weather, the SSO will determine if work can continue without sacrificing the health and safety of site personnel Some of the items to be considered prior to determining if work should continue are

- High winds,
- Heavy rainfall,
- Potential for heat stress,
- Potential for cold stress,
- Limited visibility,
- Potential for accidents, and,
- The malfunctioning of monitoring equipment

8.4.8 Electric Shock

All electrical shocks shall be considered as a physical injury and will be handled as described in Subsection 8 4 2 In addition, the following requirements will be followed

- All electric shocks are accidents and must be reported to the Field Supervisor,
- Employees who attempt to rescue shock victims must not endanger themselves or others, and,
- The electrical source should be de-energized immediately if the victim is still in contact with electrical energy

9.0 LOGS, REPORTS, AND RECORDKEEPING

9.1 General

Records shall be kept documenting the site safety program, health and safety audits, training meetings (weekly/tailgates), Radiation Work Permits, and radiological surveys A bound logbook will be used by the HSS to record results of each environmental monitoring event within the exclusion zone

9.2 Personnel Records

Records shall be kept on each on-site individual Records include a medical clearance statement from a qualified physician, fit test, and training documentation When site safety meetings are conducted, an attendance sheet that includes the subjects briefed must be kept

9.3 Calibration Records

All radiological monitoring equipment will be calibrated as described in ANSI N323-1978 "Radiation Protection Instrument Test and Calibration" and Rocky Flats directives All monitoring equipment used for health and safety purposes will be calibrated as suggested by the manufacturer Records of all calibrations will be maintained

9.4 Occupational Safety and Health Administration Form 200

An OSHA Form 200 will be posted in an area frequented by all subcontractor personnel The HSS will be responsible for maintaining this form

9.5 Health and Safety Logbook

A separate health and safety logbook and sign in/sign out log shall be maintained by the SSO throughout the project and turned in to the Project Manager after the project is completed Logged information shall include

- Names of all personnel entering and leaving the site each day,
- Daily listing of site numbers to be visited by field teams,
- Description of unforeseen hazards and steps taken to mitigate hazards,
- VOC readings taken in the breathing zone if above background,
- Summary of telephone conversations regarding health and safety,
- Safety infractions, if any,
- Accidents and injuries, and,
- All other significant health and safety items

9.6 Accident/Incident Reporting

9.6.1 Subcontractor Procedures

In the event of an accident or incident, the HSS will immediately notify the On-site Project Manager and the Health and Safety Officer (HSO) after appropriate emergency personnel have been notified Types of accidents or incidents that are considered reportable are listed in ADM 1601

Work will be suspended until the cause of the accident/incident is canceled and to modify this HASP as necessary

A accident/incident report form (DOE Form F 5484 X) must be submitted to the Project Manager (PM) and HSO within 24 hours of occurrence

9.6.2 Rocky Flats Plant Procedures

In accordance with the Site Health and Safety Plan (HSP) Section 3 03, the SSO or HSS will notify the appropriate emergency personnel at extension **2911** The Site Manager will notify the Rocky Flats Environmental Restoration (ER) Program Field Supervisor, the RFETS ER Program Manager, RFETS Site Health and Safety Coordinator of any accidents or incidents that occur during field activities that fall into the following classifications The Site Safety Officer will also submit a completed DOE Form F 5484 X for any of the following incidents

1 "Recordable" occupational injuries or illnesses as defined below

OCCUPATIONAL INJURY is any injury such as a cut, fracture, sprain, or amputation that results from a work accident or from an exposure involving a single incident in the work environment NOTE Conditions resulting from animal or insect bites, or one-time exposure to chemicals, are considered to be injuries

OCCUPATIONAL ILLNESS of an employee is any abnormal condition or disorder, other than one resulting from an occupational injury, caused by exposure to environmental factors associated with employment It includes acute and chronic illnesses or diseases that may be caused by inhalation, absorption, ingestion, or direct contact with a toxic material

2 PROPERTY DAMAGE LOSSES of $1,000 or more are reported as follows accidents that cause damage to Department of Energy (DOE) property, regardless of fault, or accident wherein DOE may be liable for damage to a second party, are reportable if damage is $1,000 or more Include damage to facilities, inventories, equipment, and properly parked motor vehicles Exclude damage resulting from a DOE-reportable vehicle accident

3 GOVERNMENT MOTOR VEHICLE ACCIDENTS resulting in damages of $500 or more, or involving injury, are reported unless the government vehicle is not at fault, damage of less than $500 is sustained by the government vehicle, or no injury is inflicted on the government vehicle occupants Accidents are also reportable to DOE if

- Damage to DOE property is greater than or equal to $500 and the driver of a government vehicle is at fault
- Damage to any private property or vehicle is greater than or equal to $500 and the driver of a government vehicle is at fault
- Any person is injured and the driver of a government vehicle is at fault

10.0 REFERENCES

Final Rocky Flats Cleanup Agreement (RFCA), 1996 Final The U S Department of Energy, U S Environmental Protection Agency, and the Colorado Department of Health

Rockwell International Corporation, 1988 Draft Remedial Investigation and Feasibility Study Plans for Low Priority Sites Volume I Site Descriptions, Groupings and Prioritization

Rocky Flats Radiological Control Manual (Site RCM), 1996, Revision 2, Rocky Flats Environmental Technology Site

Title 10 Code of Federal Regulations Part 835, Occupational Radiation Protection

U S Department of Energy (DOE), 1980 Final Environmental Impact Statement, Rocky Flats Environmental Technology Site Site, Golden, Colorado (Final Statement to ERDA 1545-D), 3 volumes DOE/EIS-0064, UC-2, 11 April

U S Department of Energy (DOE), 1986a Comprehensive Environmental Assessment and Response Program (CEARP), Phase I Installation Assessment, Rocky Flats Environmental Technology Site, Albuquerque Operations Office

U S Department of Energy (DOE), 1986b Resource Conservation and Recovery Act (RCRA), Part B Operating Permit Application for Rocky Flats Environmental Technology Site Hazardous and Radioactive Mixed Wastes CO7890010526

U S Department of Energy (DOE), 1986c Resource Conservation and Recovery Act (RCRA), Part B Operating Permit Application for Rocky Flats Environmental Technology Site Transuranic (TRU) Mixed Wastes CO7890010526

U S Department of Energy (DOE), 1987 RCRA 3004(u) Waste Management Units Appendix 1 of the Rocky Flats Environmental Technology Site RCRA Part B Operating Permit Application

U S Department of Energy (DOE), 1988 Closure Plan, Container Storage Facilities Property Utilization and Disposal Container Storage Facilities, Swinerton and Walberg Building 980 Container Storage Facility, Swinerton and Walberg Contractor Storage Yard, Building 885 Drum Storage Area, Building 881 Drum Storage Area, Building 865 Drum Storage Area, Building 883 Drum Storage Area, Building 334 Cargo Container Area, Building 444/453 Drum Storage Area, Rocky Flats Environmental Technology Site

U S Department of Energy (DOE), 1990 Final Phase III RFI/RI Work Plan, Rocky Flats Environmental Technology Site 881 Hillside Area (Operable Unit No 1), Rocky Flats Environmental Technology Site, Golden, Colorado October

U S Department of Energy (DOE), 1991a Phase II RFI/RI/FS Work Plan (Alluvial), 903 Pad, Mound, and East Trenches Areas (Operable Unit 2), Rocky Flats Environmental Technology Site, Golden, Colorado

U S Department of Energy (DOE), 1991b Phase II RFI/RI Work Plan (Bedrock), 903 Pad, Mound, and East Trenches Areas (Operable Unit 2), Rocky Flats Environmental Technology Site, Golden, Colorado

U S Department of Energy (DOE), 1991c Draft Final RFI/RI Work Plan for Operable Unit 3, Rocky Flats Environmental Technology Site, Golden, Colorado

U S Department of Energy (DOE), 1991d Draft Final Phase I RFI/RI Work Plan, Solar Evaporation Ponds (Operable Unit No 4), Rocky Flats Environmental Technology Site, Golden, Colorado

U S Department of Energy (DOE), 1991e Environmental Assessment, Dewatering and RCRA Partial Closure Action on Solar Evaporation Ponds, Rocky Flats Environmental Technology Site, Golden, Colorado, DOE/EA-0487 June

U S Department of Energy (DOE), 1991f Final Phase I RFI/RI Work Plan, Rocky Flats Environmental Technology Site Woman Creek Priority Drainage (Operable Unit No 5), Rocky Flats Environmental Technology Site, Golden, Colorado October

U S Department of Energy (DOE), 1991g Final Phase I RFI/RI Work Plan, Rocky Flats Environmental Technology Site Walnut Creek Priority Drainage (Operable Unit No 6), Rocky Flats Environmental Technology Site, Golden, Colorado Vol 1 September

U S Department of Energy (DOE), 1991h Phase I RFI/RI Work Plan, Present Landfill, IHSS 1 14, and Inactive Waste Storage area, IHSS 203 (Operable Unit No 7)

U S Department of Energy (DOE), 1991i Final Phase I RFI/RI Work Plan, Rocky Flats Environmental Technology Site Original Process Waste Lines (Operable Unit No 9), Rocky Flats Environmental Technology Site, Golden, Colorado November

U S Department of Energy (DOE), 1991j Draft Final Phase I RFI/RI Work Plan, Rocky Flats Environmental Technology Site Other Outside Closures (Operable Unit No 10), Rocky Flats Environmental Technology Site, Golden, Colorado November

U S Department of Energy (DOE), 1991k Final Phase I RFI/RI Work Plan, West Spray Field (Operable Unit No 11), Rocky Flats Environmental Technology Site, Golden, Colorado December 18

U S Department of Energy (DOE), 1992a Draft Historical Release Report for the Rocky Flats Environmental Technology Site

U S Department of Energy (DOE), 1992b Draft Phase I RFI/RI Work Plan, Rocky Flats Environmental Technology Site Site 700 Area (Operable Unit 8), Rocky Flats Environmental Technology Site, Golden, Colorado

U S Department of Health and Human Services, 1985 Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities

Woodward-Clyde, 1993 Health & Safety Plan (Accident Prevention Safety Program Plan), Rocky Flats Environmental Technology Site, Groundwater Monitoring Program

TABLE 6-1
SIGNS AND SYMPTOMS OF HEAT STRESS

Stress Type	Cause	Symptoms
Heat rash	Continuous exposure to heat or humid air	red, itchy rash on the body
Heat cramps	Heavy sweating with inadequate electrolyte replacement	muscle spasms, pain in the hands, feet, and abdomen
Heat exhaustion	Increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration	pale, cool, moist skin, heavy sweating, dizziness, nausea, fainting
Heat stroke	The most serious form of heat stress Temperature regulation fails, and the body temperature rises to critical levels Immediate action must be taken to cool the body before serious injury and death occur Competent medical help must be obtained	red, hot, and usually dry skin, lack of or reduced perspiration, nausea, dizziness or confusion, strong and rapid pulse, coma

TABLE 6-2
PERMISSIBLE HEAT EXPOSURE LIMITS
Adapted From the ACGIH 1996-or current year after 1996
(Values are given in °C and °F WBGT)*

Level of PPE	Work-Rest Regimen each hour	Work Load in WBGT					
		Light[a]		Moderate[b]		Heavy[c]	
		°C	°F	°C	°F	°C	°F
Summer work Uniform	Continuous Work	30 0	86	26 7	80	25 0	77
	75% Work / 25% Rest	30 6	87	28 0	82	25 9	78
	50% Work / 50% Rest	31 4	89	29 4	85	27 9	82
	25% Work / 75% Rest	32 2	90	31 1	88	30 0	86
Cotton Coveralls	Continuous Work	28 0	82	24 7	76	23 0	73
	75% Work / 25% Rest	28 6	83	26 0	78	23 9	74
	50% Work / 50% Rest	29 4	85	27 4	81	25 9	78
	25% Work / 75% Rest	30 2	86	29 1	84	28 0	82
Winter work Uniform	Continuous Work	26 0	79	22 7	73	21 0	70
	75% Work / 25% Rest	26 6	80	24 0	75	21 9	71
	50% Work / 50% Rest	27 4	82	25 4	78	23 9	75
	25% Work / 75% Rest	28 2	83	27 1	81	26 0	79
Water barrier, permeable	Continuous Work	24 0	75	20 7	69	19 0	66
	75% Work / 25% Rest	24 6	76	22 0	71	19 9	67
	50% Work / 50% Rest	25 4	78	23 4	74	21 9	71
	25% Work / 75% Rest	26 2	79	25 1	77	24	75

* As workloads increase, the heat stress impact on an unacclimated worker is exacerbated For unacclimatized workers performing a moderate level of work the permissible heat exposure TLV should be reduced by approximately 2 5°C

(a) Light = sitting or standing to control machinery, performing light hand or arm work
(b) Moderate = walking about with moderate lifting or pushing
(c) Heavy = pick and shovel work, hand augering

Comments For situations other than those listed above, personal heat stress monitoring is required

TABLE 7-1

RADIOLOGICAL OPERATION INSTRUCTIONS

Procedure Number	Procedure Title
ROI-0 00	**ADMINISTRATIVE PROCEDURES**
ROI-0 06	Procedure Training for Radiological Operation Personnel
ROI-0 07	Radiation, Contamination and Airborne Radioactivity Survey Frequency
ROI-1 00	**RADIATION MONITORING**
ROI-1 01	Radiation Surveys
ROI-1 03	Radiological Control Posting and Labeling
ROI-2 00	**PERSONNEL CONTAMINATION EXPOSURE**
ROI-2 01	Personnel Contamination Monitoring
ROI-2 02	Potential Intake Calculations
ROI-2 03	Wounds and Hair/Skin Contamination
ROI-2 04	Workplace Nasal/Mouth Smear Sampling
ROI-3 00	**Contamination Control**
ROI-3 01	Performance of Surface Contamination Surveys
ROI-3 02	Radiological Requirements for Radioactive Material Transfer and Unrestricted Release
ROI-3 05	Handling of Contaminated Personnel Dosimeters and Security Badges
ROI-3 07	Survey of Vehicles Used for Transport of Radioactive Materials
ROI-4 00	**AIR SAMPLING**
ROI-4 02	Air Sampling
ROI-5 00	**EMERGENCIES**
ROI-5 02	Radiological Operations Response to a Criticality Alarm
ROI-5 03	Response to a Contamination Release
ROI-5 08	General Response to Emergency Situations
ROI-6 00	**INSTRUMENTS**
ROI-6 01	Performance Test and Operational Checks for Ludlum 12-1A and 31 Survey Instruments
ROI-6 03	Performance Testing and Operation of the Eberline SAC-4 and BC-4 Smear Counters
ROI-6 06	Use of the Bicron Fiddler (Field Instrument for the Detection of Low Energy Radiation)
ROI-6 15	Control of Faulty Radiological Instruments
ROI-6 19	Performance Testing Of Portable Contamination Detection Instruments
ROI-7 00	**SPECIFIC OPERATIONS**
ROI-7 03	Establishing and Maintaining Radiological Areas and Radiological Buffer Areas
ROI-9 00	**RESPIRATORY PROTECTION**
ROI-9 01	Respiratory Protection Areas
ROI-9 05	Use of the MSA Premaire Airline Respirator
ROI-10 00	**RECORDS AND REPORTS**
ROI-11 00	**PERMITS**
ROI-11 01	Radiological Work Permit

TABLE 7-2

ACTION LEVELS FOR NONRADIOACTIVE ISSUES

Indicator	Action Level in the Breathing Zone	Action
Photoionization Detector		
PID with 11 7 eV lamp	> Background	Stop work and notify the HSS, work may be conducted in Level B PPE at the discretion of the HSS
Colormetric Detector Tubes		
Benzene Detector Tubes	> 0 5 ppm	Stop work and notify the HSS, work may be conducted in Level B PPE at the discretion of the HSS
Carbon Tetrachloride Detector Tubes	> 1 ppm	Stop work and notify the HSS, work may be conducted in Level B PPE at the discretion of the HSS
Chloroform Detector Tubes	> 1 ppm	Stop work and notify the HSS, work may be conducted in Level B PPE at the discretion of the HSS
1,1-Dichloroethene Detector Tubes	> 0 5 ppm	Stop work and notify the HSS, work may be conducted in Level B PPE at the discretion of the HSS
Methylene Chloride Detector Tubes	> 12 ppm	Stop work and notify the HSS, work may be conducted in Level B PPE at the discretion of the HSS
Tetrachloroethene Detector Tubes	> 0 5 ppm	Stop work and notify the HSS, work may be conducted in Level B PPE at the discretion of the HSS
Vinyl Chloride Detector Tubes	> 0 5 ppm	Stop work and notify the HSS, work may be conducted in Level B PPE at the discretion of the HSS
Combustible Gas Indicator		
CGI	Greater than 10% of the LEL	Exit exclusion zone and review Subsection 7 3 2

TABLE 7-3

TASK-SPECIFIC PPE REQUIREMENTS

Task and Activity		PPE Requirements	Text Reference
SOP GW 1	Water Level Measurements in Wells and Piezometers	Air monitoring, then Level D with nitrile or butyl gloves, or according to RWP requirements	7 3 2, 7 5 1
SOP GW 2	Well Development	Air monitoring, then Level D with nitrile or butyl gloves, or according to RWP requirements	7 3 2, 7 5 2
SOP GW 3	Pump in Borehole Packer Testing	Air monitoring, then Level D with nitrile or butyl gloves, or according to RWP requirements	7 3 2, 7 5 3
SOP GW 4	Slug Tests	Air monitoring, then Level D with nitrile or butyl gloves, or according to RWP requirements	7 3 2, 7 5 4
SOP GW 5	Field Measurement of Groundwater Field Parameters	Air monitoring, then Level D with nitrile or butyl gloves, or according to RWP requirements	7 3 2, 7 5 5
SOP GW 6	Groundwater Sampling	Air monitoring, then Level D with nitrile or butyl gloves, or according to RWP requirements	7 3 2, 7 5 6
SOP GW 8	Aquifer Pumping Tests	Air monitoring, then Level D with nitrile or butyl gloves, or according to RWP requirements	7 3 2, 7 5 7
SOP FO.01	Air Monitoring and Dust Control	Level D	7 5 8
SOP FO 02	Transmittal of Field QA Records	Level D	7 5 9
SOP FO 03	General Equipment Decontamination		7 3 2, 7 5 10
-	Radiological Surveys	Level D unless results exceed RCM Table 2-2 Limits, then Level C or B as appropriate, or according to RWP requirements	
-	VOC Surveys	Level D, upgrading to Level C or B as appropriate	

TABLE 7-3

TASK-SPECIFIC PPE REQUIREMENTS

Task and Activity		PPE Requirements	Text Reference
-	VOC Surveys	Level D, upgrading to Level C or B as appropriate	
-	Decontamination	Modified Level D, with coated chemical - resistant disposable coveralls, face shield, and nitrile or butyl gloves, or according to RWP requirements	
SOP FO 05	Handling of Purge and Development Water		7 3 2, 7 5 11
-	Collection	Air monitoring, then Level D, or according to RWP requirements	
-	Transfer	Air monitoring, then Level D, with ear plugs, nitrile or butyl gloves, splash apron, or according to RWP requirements	
SOP FO 06	Handling Personal Protective Equipment	Level D with nitrile or butyl gloves	7 5 12
SOP FO.07	Handling and Decontamination of Water and Wash Water	Level D with ear plugs, nitrile or butyl gloves, splash apron, or according to RWP requirements	7 5 13
SOP FO 11	Field Communications	Level D	7 5 14
SOP FO 12	Decontamination Facility Operations		7 5 15
-	Non-steam cleaner use	Level D with nitrile or butyl gloves and ear plugs, or according to RWP requirements	
-	Steam cleaner use	Modified Level D, or according to RWP requirements	
SOP FO 13	Containerization, Preserving, Handling and Shipping of Soil and Water Samples		7 5 16

TABLE 7-3

TASK-SPECIFIC PPE REQUIREMENTS

Task and Activity		PPE Requirements	Text Reference
-	Containerization and handling	Level D with nitrile or butyl gloves	
-	Preservation	Level D with nitrile or butyl gloves, splash apron, and faceshield	
-	Shipping	Level D	
SOP FO 14	Field Data Management	Office work uniform	7 5 17
SOP FO 15	Photoionization Detectors (PID and Flame Ionization Detectors (FID)	Air monitoring, then Level D, or according to task-specific requirements	7 3 2, 7 5 18
SOP FO 16	Field Radiological Measurements	Level D with nitrile or butyl gloves, or according to RWP requirements	7 5 19
SOP FO 18	Environmental Sample Radioactivity Content Screening	Level D with nitrile or butyl gloves	7 5 20
SOP FO 19	Base Laboratory Waste	Level D	7 5 21
SOP FO 25	Shipment of Radioactive Materials Samples	Level D	7 5 22
Special Tasks		Air monitoring (if required), then Level D, or as required by the Special Task Health and Safety Plan	7 3 2, 7 5 23

TABLE 8-1

EMERGENCY TELEPHONE NUMBERS

Site Health and Safety Officer	(303) 966-4953
Shift Superintendent	(303) 966-2914
Fire	(303) 966-2911
Ambulance	(303) 966-2911
Poison Center	(303) 629-1123
Security	(303) 966-3347
Medical Facility General Information	(303) 966-2594
NEAREST MEDICAL SERVICES ARE LOCATED AT	Building 122

Directions to Medical Services

From the Contractor's trailer compound, take a northbound street to Central Avenue and turn left onto Central Avenue Building 122 will be on the left side and slightly west of a guard building on the right after approximately 1 25 miles

From the RFP eastern boundary, upon entering RFP from Indiana Street, you will be on Central Avenue Proceed approximately 3 5 miles Building 122 will be on the left side

From the RFP western boundary at Hwy 93, proceed along the entrance road to just past the gate, at which time you will be eastbound on Cactus Avenue Then turn left onto the first street past Second Street, (Third Street, which is not marked) Proceed up Third Street past Building 125, which is on the left the next building on the left will be the medical facility (Building 122)

TABLE 8-2

EMERGENCY ALARMS

WARNING	SOUND	INSTRUCTIONS
Fire Alarm	Bell	Evacuate area
Civil Defense Warning Alarm	High Frequency Pitch Steady Tone	Follow public address instruction and building announcements
Civil Defense Attack Alarm	Wailing Siren	Follow public address instructions
Criticality Alarm	Wailing Tone	Evacuate building and assemble in evacuation area

An Emergency Alarm Overview training tape is available for audio review at 966-7541

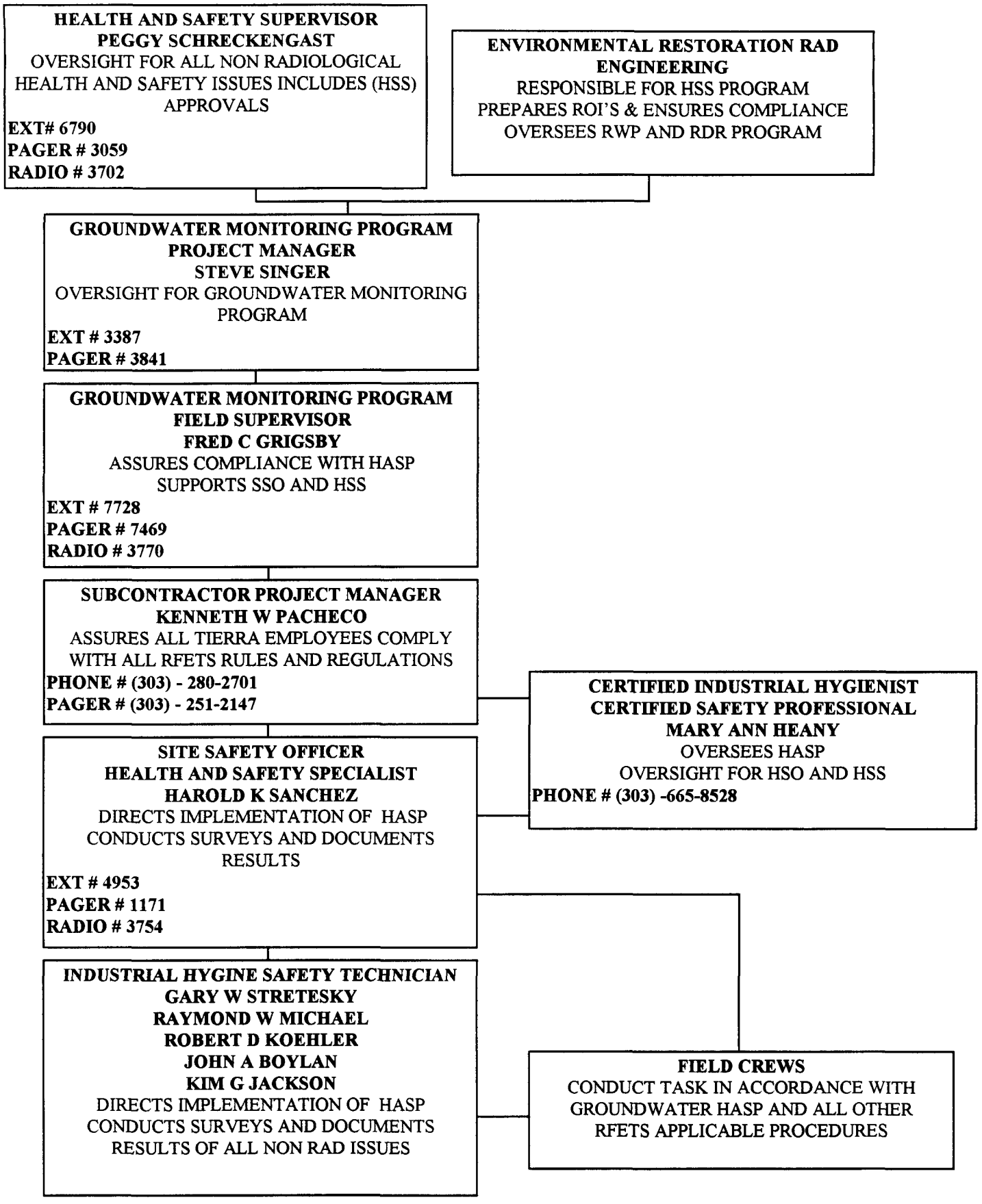
35 mm

DRAWING

FIGURE 3-2

APPENDIX A

RESPONSIBILITIES AND AUTHORITY OF HEALTH AND SAFETY PERSONNEL



HEALTH AND SAFETY RESPONSIBILITY FLOW CHART FOR GROUNDWATER MONITORING PROGRAM

FIGURE A-1

APPENDIX A

RESPONSIBILITIES AND AUTHORITY OF HEALTH AND SAFETY PERSONNEL

ENVIRONMENTAL RESTORATION RADIOLOGICAL ENGINEER

Responsibilities

- Establish qualifications for the Health and Safety Specialist (HSS) position
- Review the credentials of prospective HSSs and, when appropriate, approve individuals to complete tasks reserved for HSSs
- Review and approve subcontractor-prepared training programs that are designed to qualify a subcontractor employee to serve as an HSS
- Prepare Radiological Operation Instructions (ROI's) that address subjects such as, but not limited to, survey methods, documentation, frequencies, and locations
- Establish survey and sampling strategies for property that cannot be surveyed in accordance with the standard techniques outlined in existing ROI's, and ensure that property to be released for unrestricted use does not exceed the limits specified in Radiological Control Manual (Table 2-2)
- Provide guidance on the performance of the procedures and techniques utilized in field operations for surface contamination surveys
- Specify work controls for radiologically controlled areas, or review and approve work controls prepared by Subcontractors
- Review and approve selected radiation survey reports
- Investigate unanticipated survey results such as a lack of radioactivity when radioactivity is known to be present, or radiation levels exceeding anticipated levels
- Oversee Radiation Work Permit (RWP) program administration
- Oversee Radiological Deficiency Report (RDR) program administration
- Sign, or designate a representative to sign, forms such as property releases

- Perform dose reconstruction for personnel whose dosimeters have been contaminated or are deemed "unreadable "
- Determine the appropriate posting and control of radiologically contaminated sites and approve the deposting of signs
- Evaluate Possible Inhalation Exposures and decide on appropriate actions
- Evaluate possible wound and skin contamination incidents
- Provide support for the evaluation and control of work requiring respiratory protection
- Perform all additional specific procedural duties relating to EM field activities detailed in the Radiological Engineering Procedures Manual, applicable Radiological Engineering documents, and the applicable HSP manual
- Anticipate, recognize, and evaluate radiological health hazards, and recommend control measures as necessary Engineering controls shall be emphasized
- Perform quarterly inspections of OUs and Hazardous Waste Areas (HWAs) to determine compliance with the Health and Safety Plans
- Ensure, in conjunction with Industrial Hygiene and Environmental Management, that site characterization and analysis, in accordance with 29 CFR 1910 120, is performed to identify specific site radiological hazards at OUs and to determine the necessary safety and health control procedures to protect personnel from the identified hazards
- Ensure, in conjunction with Industrial Hygiene and Environmental Management, that appropriate site control procedures are implemented before cleanup work begins to control personnel exposure to radiological hazards

- Provide technical review of all Health and Safety Plans, Job Safety Analyses (JSAs), Integrated Work Control Programs (IWCPs), and procedures as necessary

- Implement Radiological Protection Program

ROCKY FLATS PRIME CONTRACTOR HEALTH AND SAFETY SUPERVISOR

Responsibilities

- Anticipate, recognize, and evaluate non-radiological health hazards, and recommend control measures as necessary Engineering controls shall be emphasized, rather than administrative or personal protective equipment (PPE) controls

- Perform monthly inspections of the Groundwater Monitoring Operations to determine compliance with the Health and Safety Plan

- Ensure, in conjunction with Environmental Management and Radiological Engineering, that site characterization and analysis, in accordance with 29 CFR 1910 120, is performed to identify specific site health hazards at OUs and to determine the necessary safety and health control procedures to protect personnel from identified hazards

- Ensure, in conjunction with Environmental Management and Radiological Engineering, that appropriate site control procedures for OUs are implemented before cleanup work begins, to control personnel exposure to hazardous substances

- Ensure, in conjunction with Waste Operations, Radiological Engineering, Waste Programs, Environmental Management, and Occupational Safety personnel, that specific site health hazards at HWAs and OUs are identified, and to determine necessary safety and health control procedures to protect personnel from the identified hazards

- Provide a Subject Matter Expert (SME) for technical input to all plant training applicable to 29 CFR 1910 120

- Provide technical review of all Health and Safety Plans, JSAs, IWCP documents, and procedures, as necessary

- Coordinate preparation and approval of OU and HWA Health and Safety Plans
- Coordinate review and approval of Health and Safety Plan field changes
- Oversee RFETS and subcontractor work to verify compliance with the requirements of Health and Safety Plans
- Perform audits for proper and appropriate use of PPE, monitoring and decontamination procedures, site control, and all required documentation

NOTE

Radiological decontamination procedures shall be reviewed by Radiological Engineering personnel

- Alert the Site Manager, and Site Safety Officer of any safety violations
- Provide health and safety support for RFETS employees

GROUNDWATER MONITORING PROGRAM (GMP)- PROJECT MANAGER

Responsibilities

- Direct the development of a formal training program designed to qualify subcontractor employees to be designated as HSSs by the EMRE The training program will include classroom sessions and supervised field work, and will be submitted to the EMRE for approval
- Direct and monitor the implementation of the health and safety program
- Advise personnel on health and safety matters

- Issue directives, advisories, and information to the Corporate Health and Safety Manager (CHSM)
- Advise the CHSM on the policy, liability, and professional issues
- Assure that adequate funds are allocated to fully implement project health and safety plans
- Nominate Site Safety Officer (SSOs) and Health and Safety Specialists (HSSs) for EMRE approval

Authority

- Direct changes in the health and safety program
- Determine and implement personnel disciplinary actions, as required
- Approve and audit project health and safety expenditures

CORPORATE HEALTH AND SAFETY MANAGER (CHSM)

Responsibilities

- Track health and safety regulations and implement improvements to the health and safety program
- Ensure records are maintained pertaining to medical surveillance, training, fit testing, chemical exposure, and incidents
- Update health and safety manual
- Manage medical surveillance program
- Ensure health and safety training is obtained
- Provide industrial hygiene/chemical safety guidance to SSOs

- Audit key aspects of health and safety program and report effectiveness to project manager
- Investigate reports of incidents or accidents
- Provide guidance on radiological issues

Authority

- Approve the qualifications of employees to work at the decontamination pads
- Establish employee training and medical surveillance procedures
- Suspend work on any project that jeopardizes the health and safety of personnel
- Access project files to perform health and safety audits or investigate accidents/incidents
- Remove individuals from projects if their conduct jeopardizes their health and safety or that of co-workers

SITE SAFETY OFFICER (SSO)

Responsibilities

- Implement the applicable Site-Specific HSP (SSHSP) and verify compliance with all applicable health and safety requirements
- Ensure that updated copies of the Health and Safety Plan (HSP), applicable SSHSP, ROI's, and all documents referenced by the ROI's, are available to subcontractor employees
- Supervise HSSs in the performance of their responsibilities
- Ensure HSSs and subcontractor employees are advised of the radiological hazards, both expected and suspected, by posting and controlling radiological areas according to ROI's instructions

- Ensure that HSP 18 19, "Criteria and Actions for Potential Intakes," is adhered to for the duration of the project

- Verify that performance of RFETS and subcontractor-owned instruments has been conducted in accordance with the manufacturer's recommendations The SSO will also ensure that the test results are recorded daily in a calibration log specific to each instrument

- Review and approve completed survey reports/forms If an unsatisfactory report/form is received, it will be returned to the appropriate individual(s) for correction When conducting that review the SSO will ensure that

  - the correct report/form is complete
  - the entries are reasonable
  - the required signatures are affixed to the report

- Forward approved survey reports/forms to the EMRE and maintain a file of all completed Radiological Survey Forms This file will be organized by survey areas, with an index placed in the front of the file

- Immediately contact the EMRE by phone when survey results indicate radiation levels exceeding 5 millirems/hour (mrem/h) For contaminant radiation levels requiring access controls not already established, or levels exceeding an established action level, the EMRE will also be notified

- Maintain an Instrumentation Field Log Book which documents the specific equipment used at the work site

- Interface with project manager in matters of health and safety

- Report to CHSM and project manager on health and safety matters

- Develop or review project health and safety plans prior to submittal to RFETS for review

- Conduct staff training and orientation on health and safety related activities

- Monitor compliance with health and safety plans and conduct site audits

- Assist project managers with obtaining required health and safety equipment

- Ensure compliance to relevant and appropriate OSHA requirements

Authority

- Suspend work or otherwise limit exposures to personnel if health and safety plans appear to be unsuitable or inadequate or if health or safety of personnel is endangered
- Direct personnel to change work practices if existing practices are deemed to be hazardous to health and safety of personnel
- Remove personnel from projects if their actions or condition endanger their health and safety or the health and safety of co-workers

SITE MANAGER

Responsibilities

- Assure that the project is performed in a manner consistent with the health and safety program
- Assure that the project health and safety plan is prepared, approved, and properly implemented
- Provide the SSO with the information needed to develop health and safety plans
- Coordinate with the SSO and project manager on health and safety matters
- Assure compliance with health and safety plans
- Assure that Environmental Management Division Operating Procedures are maintained and that the Health and Safety Specialist (HSS) reviews Document Change Notices for any health and safety implications

Authority (Safety Related)

- Assign SSO-approved HSS to project and, if necessary, assign a suitably qualified replacement

- Temporarily suspend field activities if health and safety of personnel are endangered, pending an evaluation by the SSO or CHSM

- Temporarily suspend an individual from field activities for infractions of the Health and Safety Plan, pending an evaluation by the SSO or CHSM

HEALTH AND SAFETY SPECIALIST (HSS)

Responsibilities

- Conduct surveys and document the results, as required by the ROI's, the applicable SSHSP, and the RFETS -Wide SOPs

- Supervise Industrial Hygiene and Safety Technician (IHST) during field activities (IH) activities only, No RAD activities_

- Countersign all reports/forms completed by the (IHST)

- Forward completed survey reports/forms to the SSO

- Notify the SSO of survey results that indicate radiation levels exceeding 5 mrem/h, levels, or RCM Table 2-2 levels requiring access controls not already established, or levels exceeding an established action level

- Control access and advise all personnel when radiological precautions are required

- Complete performance and operational checks required for radiation instruments and make entries in the Instrumentation Field Log Book

- Direct health and safety activities on site

- Provide a copy of the Health And Safety Plan to all field crews

- Report immediately all safety-related incidents or accidents to the SSO and project manager

- Assist project managers in all aspects of implementing health and safety plans

- Maintain health and safety equipment on site

- Implement emergency procedures as required
- Be approved by RFETS Radiological Engineering and Industrial Hygiene to conduct radiological monitoring procedures as outlined by ROI's and complete all other related tasks assigned to Health and Safety Specialist
- Maintain a file of Radiological Operation Instructions (ROI's) and complete all responsibilities assigned to the Health and Safety Specialist
- Review Document Change Notices (DCNs) to Environmental Management Division Operating Procedures and, when necessary, implement appropriate health and safety procedures
- Conduct monitoring for chemical and physical hazards

Authority

- Temporarily suspend field activities if health and safety of personnel are endangered, pending further consideration by the HSO and/or CHMS
- Temporarily suspend an individual from field activities for infractions of the Health and Safety Plan, pending further consideration by the HSO and/or CHMS

INDUSTRIAL HYGIENE AND SAFETY TECHNICIAN

The (IHST) shall assist the HSS in implementing this plan An (IHST) will be present in the immediate vicinity during all field activities

Responsibilities

- Ensure that each individual within his/her jurisdiction complies with the provisions of this plan
- Audit safety practices used by on-site teams
- Provide on-site air monitoring during field activities, if necessary

- Communicate with command post for on-site activities
- Supervise decontamination, monitor workers for heat or cold stress, and distribute health and safety equipment if certified by IH to perform these tasks
- Document safety practices
- Initiate appropriate emergency procedures

Authority

- The (IHST) shall have the authority to stop work in case of an imminent safety hazard or potentially dangerous situation, after stopping work, the (IHST) shall immediately consult the HSS and RFETS project manager

The DOE Rocky Flats Plant produces "triggers" for nuclear weapons, which involves the processing and machining of plutonium, as well as the use of beryllium and other materials Uranium and other radionuclides are known to be present on the site, either from process operations or from the disposal of wastes from other facilities

Normal process releases from this facility are reported to be minimal, although there are several historical incidents that have released significant quantities of contaminants

Plutonium can spontaneously combust in air, a characteristic which contributed to serious fires that released plutonium to the environment in 1957 and 1969. In 1969 a glovebox fire resulted in the release of several kilograms of plutonium to the environment. Analysis of soil samples, taken mostly east of DOE property, found up to 6 pCi/g on the top centimeter of soil (background is 0 04 pCi/g) shortly after this fire In 1974 there was another accidental release of plutonium to the air

Starting in 1958, barrels containing used machining fluids were stored outdoors at a location now called the 903 Pad. Leakage from the barrels was discovered in 1964. By 1968, the last barrels had been removed and the area was monitored for alpha activity Levels of up to 13.5 μCi/g of soil were found, with activity penetrating to 8 inches deep. Rocks were removed from the area and fill was applied to the storage area, which was then paved. Additional fill was added to the area surrounding the 903 Pad in 1970 after soil sample analysis revealed greater than 50 pCi/g of alpha activity

Other sites on the facility that may be significant contaminant sources include the West Spray Fields, an area east of the plant used for burial called the East Mounds, the 881 Hillside area, and the solar evaporation ponds With the exception of the West Spray Fields, all of these locations are to the east of the new sanitary landfill sites

The distribution of radioactive dusts in the environment is driven by prevailing wind patterns and drainage patterns at the Plant site Both the prevailing winds and drainage patterns are west-to-east, with a significant north/south component for prevailing winds This can be verified

inhalation or ingestion of this material, as alpha radiation may be very damaging from within the body

Am^{241}

Am^{241} is a contaminant of weapons-grade plutonium, present at less than 20% of the concentration of Pu^{239} Major radiations from this material include the following:

alpha (He^{2+})	5 49 MeV (85%)
	5 44 MeV (13%)

Am^{241} emits some gamma (photons) of low energy, the most important being:

0 060 MeV (36%)

Am^{241} is beta stable.

The radiation of concern (alpha) is not sufficiently penetrating to penetrate the dead layers of the skin, which means Am^{241} is not an external hazard. However, it is very important to avoid inhalation or ingestion of this material, as alpha radiation may be very damaging from within the body

U^{235}

U^{235} is also known to be present in some soils at this site U^{235} is normally present as 0 7 percent of the total uranium present. Major radiations from this material include the following

alpha (He^{2+}	4 58 MeV (8%)
	4 40 MeV (57%)
	4.37 MeV (18%)

Gamma emissions are principally due to the presence of thorium daughter radiations, the most important being

the body At concentrations much higher than are expected to be present at this site, U^{238} can be an external hazard from daughter gamma emissions The beta emissions are not sufficiently energetic to penetrate the outer (dead) layers of skin

APPENDIX C

LIST OF CHEMICAL SUBSTANCES FOUND AT ROCKY FLATS PLANT

Note: The reader should keep in mind that a material safety data sheet (MSDS) for a given substance provides information concerning the substance in a relatively pure from and that the substances that may be encountered during this project will be at very low concentrations from the view point of significant occupational exposures MSDSs for chemicals of concern are kept on EG&G Environmental Restoration Office (T891E) Analyte concentrations for combined operable units 1-6 and Upper and Lower Interceptor ditches are provided in Table B-1

TABLE C-1

ANALYTE CONCENTRATIONS FOR COMBINED OPERABLE UNITS 1 16 AND UPPER AND LOWER SOUTH INTERCEPTOR DITCHES[1]

Parameter	Groundwater			Surface Water			Soils			Sediments		
	Maximum*	Minimum**	Potential ARAR	Maximum*	Minimum*	Potential ARAR	Maximum*	Minimum**	Potential ARAR	Maximum*	Minimum**	Potential ARAR
METALS (TOTAL AND DISSOLVED) (mg/L)				(mg/L)			(mg/kg)			(mg/kg)		
Aluminum	37 7	0.200	0.2	293	0.200	0.200	70600	40		33900	40	
Antimony	0.628	0.060		0.643	0.060	0.060	57	12	30	69 7	12	
Arsenic	3.0	0.010	0 05	1.03	0.010	0.05	64	2.0		49.2	2	
Barium	0.943	0.200	1.0	11600	0.200	1.0	1899	40	4000	706	40	
Beryllium	0.04	0.005	0.1	0.170	0.005	0.005	18.3	1 0	0.143	15.5	1 0	
Boron	0.218	5.0	5 0									
Cadmium	0 0352 BR	0 005	0 005	25	0.005	0 005	119	1 0		19.5	1 0	
Calcium	99 9 BR	5.000		1590	5 000		254000	2000		132000	2000	
Cesium	0 4	1.000		12	1 000		2410	200		700		
Chromium	0.172 BR	0.010	0.05	0.298	0.010	0.05	781	2.0	8000(III)	64	2.0	
Cobalt	0.22	0.050	0 05	0.489	0.050		88.9	10		43.3 *	10	
Copper	3.13	0.025	0.2	0.908	0 025	0.025	73.6	5 0		275	5 0	
Iron	76.6	0.100	0.3	3220	0 100	0.30	75900	20		33300	20	
Lead	2.8	0 005	0.05	0.950	0 005	0 005	86.9	1 0		255	1 0	
Lithium	1 79	0 100	2.5	85.2	0 100		100	20		958	20	
Magnesium	788	5 000		391	5 000		23300	2000		103000	2000	
Manganese	11.34	0.015	0 05	27 7	0 015	0 050	3540	3 0		1950	3 0	
Mercury	0 013	0 0002	0 002	3.97	0.0002	0.0002	114	0.2		1.5	0.2	
Molybdenum	1 92 BR	0.200		0 680	0.200		38.65	40		177	40	
Nickel	11 7	0.040	0 2	0.82	0 040	0.4	543	8.0	2000	89.2	8.0	
Phosphorus	1.210	0.040		12	0.040					655	200	
Potassium	7050	5 000		4260	5 000		8020	2000		67000	2000	

B = Present in laboratory blank
* = These are based on human health and environmental risk assessment criteria developed for screening purposes, or applicable state or federal requirements.
J = Analyzed below detection limit
BR = Bedrock (including some weathered bedrock)
\+ = Maximum concentration may be a one-time measurement. Values compiled from both recent and historic data, checked against Rocky Flats Environmental Data System.
\+ + = Value given is detection or quantitation limit for analysis, in accordance with Statement of Work for General Radiochemistry and Routine Analytical Services Protocol (G R.A.S.P) v 1 1 1990 EG&G Rocky Flats Environmental Restoration Program
(a) = Plutonium 238 + 239 + 240
(b) = Radium 226 + 228
(c) = Ammonia as N
(d) = Sum of polychlorinated biphenyls (PCBs) in water

[1] = Source: U.S. Department of Energy March 1992. Annual Report for Treatability Studies at Rocky Flats Plant Fiscal Year 1991.
[4] = This table was reproduced precisely from a previous report.

TABLE C-1

ANALYTE CONCENTRATIONS FOR COMBINED OPERABLE UNITS 1 16 AND UPPER AND LOWER SOUTH INTERCEPTOR DITCHES

(Continued)

Parameter	Groundwater			Surface Water			Soils			Sediments		
	Maximum*	Minimum**	Potential ARAR	Maximum*	Minimum**	Potential ARAR	Maximum*	Minimum*	Potential ARAR	Maximum*	Minimum**	Potential ARAR
Selenium	100.3	0.005	0.010	0.55	0.005	0.005	6.5	1.0		21.3	1.0	
Silicon	56.4	0.010		44	0.010					2470	4.6	
Silver	0.217	0.010	0.050	0.148	0.010	0.010	40.9	2.0	200	411	2.0	
Sodium	4447	5.000		9080	5.000		44000	2000		1480	2000	
Strontium	82.4	0.200		11.9	0.200		1030	40		1230	40	
Thallium	0.544	0.050		0.029	0.050	0.050	5.74	2.0		90	2.0	
Tin	1.121	0.200		1.53	0.200		382	40		1080	40	
Vanadium	0.85	0.050	0.1	1.65	0.050		2590	10		90.4	10	
Zinc	5.0	0.020	2.0	28.7	0.020	0.110	487	4.0		735	4.0	
ANIONS (mg/L)				(mg/L)			(mg/kg)			(mg/kg)		
Ammonia	1100	5.0	250	68	0.5	0.5	20			210		
Chloride	3.8	0.01	0.2	1200	5.0	230	19.8			1.0		
Cyanide	8.2	5.0	5.0	0.6	0.01	0.01						
Fluoride	1450	5.0	10.0	7.7	5.0	5.0	4.3			35.86		
Nitrate as N				1186	5.0	10.0						
RADIONUCLIDES (TOTAL AND DISSOLVED) (pCi/L)				(pCi/L)			(pCi/g)			(pCi/g)		
Americium 241	9.68	0.01		90	0.01	30	22	0.02		1.467	0.02	
Cesium 137	7.72	1.0		12	1.0		4.7	0.1		3.2	0.1	

* = Present in laboratory blank
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J = Analyzed below detection limit
BR = Bedrock (including some weathered bedrock)
\+ = Maximum concentration may be a one-time measurement. Values compiled from both recent and historic data checked against Rocky Flats Environmental Data System.
\+ + = Value given is detection or quantitation limit for analysis, in accordance with Statement of Work for General Radiochemistry and Routine Analytical Services Protocol (G.R.R.A.S.P.), v 1.1, 1990 EG&G Rocky Flats Environmental Restoration Program.
(a) = Plutonium 238 + 239 + 240
(b) = Radium 226 + 228
(c) = Ammonia as N
(d) = Sum of polychlorinated biphenyls (PCBs) in water

I = Source: U.S. Department of Energy March 1992. Annual Report for Treatability Studies at Rocky Flats Plant Fiscal Year 1991.
4 = This table was reproduced precisely from a previous report.

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TABLE C-1

ANALYTE CONCENTRATIONS FOR COMBINED OPERABLE UNITS 1 16 AND UPPER AND LOWER SOUTH INTERCEPTOR DITCHES

(Continued)

Parameter	Groundwater			Surface Water			Soils			Sediments		
	Maximum*	Minimum**	Potential ARAR	Maximum*	Minimum**	Potential ARAR	Maximum*	Minimum**	Potential ARAR	Maximum*	Minimum**	Potential ARAR
Gross Alpha	2000	2.0	7.0	2107	2.0	7.0	480	4.0	5.0	77	4.0	5.0
Gross Beta	1200	4.0	5.0	3800	4.0	5.0	49.9	10	50.0	53	10	50
Plutonium 238	0.040	0.01	0.05	0.031	0.01					0.016	0.03	
Plutonium 239 + 240	8.13	0.01	15(a)	120	0.01	15(a)	180	0.03	0.9	3.3	0.03	0.9
Radium 226	3.54	0.5	5(b)	30	0.5	5(b)	1.9	0.5		1.96	0.5	
Radium 228	13.95	1.0	5(b)	52	0.5	5(b)	2.8	0.5		4.41	0.5	
Strontium 89 + 90	7.52	1.0		4.27	1.0		1.9	1		2.53	1	
Strontium 90	12.4	1.0	8.0	33.34	1.0	8.0	4.57	1		0.99	1	
Tritium	12000	400	500	13000	400	500	3.9	400		580	400	
Uranium 233 + 234	1000	0.6		1050	0.6		3.7	0.3		4.11	0.3	
Uranium 233 + 238 + 239	16.9	0.6		14.31	0.6					3.32	0.3	
Uranium 235	47	0.6		65.5	0.6		1.01	0.3		1.34	0.3	
Uranium 235 + 236	6.90	0.6		47.5	0.6					0.15		
Uranium 238	750	0.6		1211	0.6		3.9	0.3		3.82	0.3	
Uranium (Total)	637	0.6	5	1023	0.6	5.0	4.0 BR	0.3		4.8	0.3	
VOLATILES (ug/L)				(ug/L)			(ug/kg)			(ug/kg)		
1,1 Dichloroethane	344	5.0		50	5.0		49	5				
1,1 Dichloroethene	48000	5.0	7	143	5.0	7.0	110	5	12000	5.0 J	5.0	
1,1,1 Trichloroethane	30250	5.0	200	42	5.0	200	290	5.0	7000000	3.0 J	5.0	

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J = Analyzed below detection limit
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TABLE C-1

ANALYTE CONCENTRATIONS FOR COMBINED OPERABLE UNITS 1 16 AND UPPER AND LOWER SOUTH INTERCEPTOR DITCHES

(Continued)

Parameter	Groundwater			Surface Water			Soils			Sediments		
	Maximum*	Minimum**	Potential ARAR	Maximum*	Minimum**	Potential ARAR	Maximum*	Minimum*	Potential ARAR	Maximum*	Minimum**	Potential ARAR
1 1,2-Trichloroethane	14740	5.0	5.0	6.0	5.0	5.0	62	5.0	120000			
1 1,2,2-Tetrachloroethane	15	5.0	5	440	5.0	5.0						
1,2-Dichloroethane	16000	5.0	5	23			120	5.0	7700			
1,2-Dichloroethene (Total)	14000	5.0	100	460	5.0	100	140	5.0				
1,2-Dichloropropane	6	5.0	5	7.0	5.0	5.0	3.0	5.0				
1,3-Dichloropropene	3 J	5.0		7.0	5.0	10	6.0 J	5.0	3900			
2 Butanone	580	10		76	10		530	10.0		12000	10	
2-Chloroethylvinylether				5.0 J			31 J	10.0				
2-Hexanone	975	10		87			41					
4-Methyl-2-Pentanone	35	10.0		32	10		120 J	10		220	10	
Acetone	4100 J	10.0	4000	970	10	4000	2400 *	10	8000000	7300	10	
Benzene	83 J	5.0	5.0	83	5	5	12 J	10	24000	3.0 J	10	
Bromodichloromethane	1.0 J	5.0	5.0	6.0	5	700						
Bromoform	1.0 J	5.0	5.0	3.0 J	5	700						
Bromomethane	7.0 J	10.0	10	8.0 J	10	48	6.0 J	10	30000			
Carbon Disulfide	28	5.0	4000	29	5.0	4000	150		8000000	13 J	5.0	
Carbon Tetrachloride	28000	5.0	5.0	1005	5.0	5.0	180	5.0	5400			
Chlorobenzene	73	5.0		94	5.0	100	150	55	2000000	4.0 J	5.0	
Chloroethane	17	10.0		34	10		50 J	10				
Chloroform	5427	5.0	5.0	84	5.0	5.0	130 J	5.0	110000	18	5.0	
Chloromethane	17	10.0		38	10					60	10	

* = Present in laboratory blank
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J = Analyzed below detection limit
BR = Bedrock (including some weathered bedrock)
+ = Maximum concentration may be a one-time measurement. Values compiled from both recent and historic data, checked against Rocky Flats Environmental Data System.
++ = Value given is detection or quantitation limit for analysis, in accordance with Statement of Work for General Radiochemistry and Routine Analytical Services Protocol (G.R.R.A.S.P.), v 1.1, 1990, EG&G Rocky Flats Environmental Restoration Program.
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(b) = Radium 226 + 228
(c) = Ammonia as N
(d) = Sum of polychlorinated biphenyls (PCBs) in water

! = Source: U.S. Department of Energy March 1992. Annual Report for Treatability Studies at Rocky Flats Plant Fiscal Year 1991
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(4037 200-0804)(H&S-8.T1)(11 10-92)

TABLE C-1

ANALYTE CONCENTRATIONS FOR COMBINED OPERABLE UNITS 1 16 AND UPPER AND LOWER SOUTH INTERCEPTOR DITCHES

(Continued)

Parameter	Groundwater			Surface Water			Soils			Sediments		
	Maximum*	Minimum**	Potential ARAR	Maximum*	Minimum**	Potential ARAR	Maximum*	Minimum*	Potential ARAR	Maximum*	Minimum**	Potential ARAR
Dibromochloromethane				5.0	5.0	6.0						
Ethylbenzene	16	5.0	680	18	5.0	680	780	5.0	8000000	4.0	5.0	
Methylene Chloride	4100	5.0	5.0	340	5.0	5.0	590 BR	5.0	93000	16000	5.0	
Styrene	9	5.0	100	6.0	5.0	100	17 J	5.0	23000	2.0 J	5.0	
Tetrachloroethene	528000	5.0	5.0	280	5.0	5.0	10000	5.0	140000	8.0	5.0	
Toluene	270 J	5.0	1000	94	5.0	1000	860	5.0	20000000	120	5.0	
Trichloroethene	221860	5.0	5.0	2500	5.0	5.0	17000	5.0	64000	39	5.0	
Vinyl Acetate	39 J	10		3.0 J	10							
Vinyl Chloride	930	10	10	25	10	10				57 J	10	
Xylenes (Total)	50 J	5.0	10000	40	5.0	10000	3300	5.0	200000000	7.0 J	5.0	
SEMIVOLATILES (TOTAL) (ug/L)				(ug/L)			(ug/kg)			(ug/kg)		
Acenaphthene				5.0 J	10	520	57 J	330		2400 J	330	
Acenaphthylene										450 J	330	
Aldrin				0.06	0.05	0.05						
Alpha BHC				0.01 J	0.05	0.05				47 J	8.0	
Alpha-chlordane				2.6	0.5	0.5						
Ametryn				0.18	0.06							
Anthracene				2.0 J	10	10	180 J	330		2900 J	330	
Atrazine				2720.0	0.05	3.0						

- = Present in laboratory blank
- = These are based on human health and environmental risk assessment criteria developed for screening purposes, or applicable state or federal requirements.
J = Analyzed below detection limit
BR = Bedrock (including some weathered bedrock)
\+ = Maximum concentration may be a one-time measurement. Values compiled from both recent and historic data, checked against Rocky Flats Environmental Data System.
++ = Value given is detection or quantitation limit for analyses, in accordance with Statement of Work for General Radiochemistry and Routine Analytical Services Protocol (G R R A S P), v 1.1, 1990, EG&G Rocky Flats Environmental Restoration Program.
(a) = Plutonium 238+239+240
(b) = Radium 226+228
(c) = Ammonia as N
(d) = Sum of polychlorinated biphenyls (PCBs) in water

1 = Source: U.S. Department of Energy March 1992. Annual Report for Treatability Studies at Rocky Flats Plant Fiscal Year 1991.
▲ = This table was reproduced precisely from a previous report.

(4077-200-0004)(H.8S-B.T)(11 10-92)

TABLE C-1

ANALYTE CONCENTRATIONS FOR COMBINED OPERABLE UNITS 1-16 AND UPPER AND LOWER SOUTH INTERCEPTOR DITCHES

(Continued)

Parameter	Groundwater			Surface Water			Soils			Sediments		
	Maximum*	Minimum**	Potential ARAR	Maximum*	Minimum**	Potential ARAR	Maximum*	Minimum**	Potential ARAR	Maximum*	Minimum**	Potential ARAR
Benzo (a) Anthracene				2.0 J	10	10	120 J	330	224	7100	330	
Benzo (b) Fluoranthene				3.0 J	10	10	350 J	330		7100	330	
Benzo (k) Fluoranthene				4.0 J	10	10	320 J	330		6300	330	
Benzo (g,h,I) Perylene							50 J	330		5700	330	
Benzo (a) Pyrene				3.0 J	10 0	10	230 J		60 9	6300	330	
Benzo (k) Pyrene							130 J	330				
Benzoic Acid				8.0 J	50		400 J	1600		3300 J	1600	
Benzyl Alcohol				43	10							
Beta-BHC				0.1	0.05	0.05				13000	8.0	
Bis (2-ethylhexyl) Phthalate	100 J BR	10	10	220	10	10	18000	330	83000	41	330	
Butyl Benzyl Phthalate	2.0 J	10		3.0 J	10	3000	510 J	330		540 J	330	
4-Chloro-3-methylphenol				1 0 J	10	30	740	330				
4-Chlorophenyl Phenyl Ether							40 J	330				
Chrysene	420	10		2.0 J	10	10	550 J	330		8200	330	
Cyanazine				0.3	0 1							
4 4-DDT				0.06 J	0 1	0 1				95	16	
Delta-BHC				0.02	0 05					3.2 J	8.0	
Dibenzo (a,h) Anthracene										1200	330	
Dibenzofuran				1 0 J						1000 J		
Dicamba				2.1	0.27							
1 4-Dichlorobenzene				4.0 J	10	75						

= Present in laboratory blank
* = These are based on human health and environmental risk assessment criteria developed for screening purposes, or applicable state or federal requirements.
J = Analyzed below detection limit
BR = Bedrock (including some weathered bedrock)
\+ = Maximum concentration may be a one-time measurement. Values compiled from both recent and historic data, checked against Rocky Flats Environmental Data System.
\+ + = Value given is detection or quantitation limit for analysis, in accordance with Statement of Work for General Radiochemistry and Routine Analytical Services Protocol (G.R.R.A.S.P.), v 1.1 1990, EG&G Rocky Flats Environmental Restoration Program.
(a) = Plutonium 238 + 239 + 240
(b) = Radium 226 + 228
(c) = Ammonia as N
(d) = Sum of polychlorinated biphenyls (PCBs) in water

1 = Source: U.S. Department of Energy March 1992. Annual Report for Treatability Studies at Rocky Flats Plant Fiscal Year 1991
Δ = This table was reproduced precisely from a previous report.

(4057 200-8004)(H&S-R.T1)(11 10-92)

TABLE C-1

ANALYTE CONCENTRATIONS FOR COMBINED OPERABLE UNITS 1-16 AND UPPER AND LOWER SOUTH INTERCEPTOR DITCHES

(Continued)

Parameter	Groundwater			Surface Water			Soils			Sediments		
	Maximum*	Minimum**	Potential ARAR	Maximum*	Minimum**	Potential ARAR	Maximum*	Minimum**	Potential** ARAR	Maximum*	Minimum**	Potential ARAR
Dichloroprop				1.8	0.65							
Diethyl Phthalate				6.0 J	10	23000	31	330	60000000	1200	330	
Di-n-Butyl Phthalate	170 J BR	10	10	20	10	10	3643 J	330	8000000	3100	330	
Di-n-Octyl Phthalate	56 J BR	10		24 +	10		370 J	330		2000	330	
2,4-Dimethylphenol				6.0 J	10	2120						
2,4-Dinitrotoluene				4.0 J	10	10				1600 J	8.0	
Endosulfan												
Ethyl Parathion	0.04			270		0.13				16000	330	
Fluoranthene	10		10	2.0 J	10	42	1900	330		2000 J	330	
Fluorene				3.0 J	10	10	350	330		50	8.0	
Gamma BHC (Lindane)										440 J	330	
Hexachlorobenzene							80 J	330		5000 J	330	
Indeno (1,2,3-cd) Pyrene				1.0 J	10	10				350 J	330	
Isophorone				21 J	10					2300	330	
2 Methylnaphthalene				43	10					2300	330	
2 Methylphenol				160	10					1100 J	330	
4-Methylphenol				25	10	10						
Naphthalene												
2-Nitrophenol	3.0 J	10					160 J	1600		5300 J	1600	
4-Nitrophenol	2.0 J	50										
4-Nitroaniline												

* = Present in laboratory blank
** = These are based on human health and environmental risk assessment criteria developed for screening purposes, or applicable state or federal requirements.
J = Analyzed below detection limit
BR = Bedrock (including some weathered bedrock)
\+ = Maximum concentration may be a one-time measurement. Values compiled from both recent and historic data, checked against Rocky Flats Environmental Data System.
\+ + = Values given is detection or quantitation limit for analysis, in accordance with Statement of Work for General Radiochemistry and Routine Analytical Services Protocol (G.R.R.A.S.P.), v 1.1 1990, EG&G Rocky Flats Environmental Restoration Program
(a) = Plutonium 238 + 239 + 240
(b) = Radium 226 + 228
(c) = Ammonia as N
(d) = Sum of polychlorinated biphenyls (PCBs) in water

1 = Source: U.S. Department of Energy March 1992. Annual Report for Treatability Studies at Rocky Flats Plant Fiscal Year 1991
4 = This table was reproduced precisely from a previous report.

(4827 200-0004)(14.5-8.T1)(11 10-93)

TABLE C-1

ANALYTE CONCENTRATIONS FOR COMBINED OPERABLE UNITS 1-16 AND UPPER AND LOWER SOUTH INTERCEPTOR DITCHES (Concluded)

Parameter	Groundwater			Surface Water			Soils			Sediments		
	Maximum*	Minimum**	Potential ARAR	Maximum*	Minimum**	Potential ARAR	Maximum*	Minimum**	Potential** ARAR	Maximum*	Minimum**	Potential ARAR
N-Nitroso-di-n-Propylamine				5 J	10	10						
N-Nitrosodiphenylamine	162 *	10	10	300	10	10	880 J	330		2000 *	330	
Pentachlorophenol	4.0 J	50	50	20 J	50	50	110 J	1600	200000	350 J	1600	
Phenanthrene				6.0 J	10	10	500 J	330		16000	330	
Phenol	1.0 J	10	10	39	10	10	330 J	330	3000000	660 J	330	
Prometon				0.09	0.03							
Prometryn				0.18	0.06							
Propazine				2.4	0.03							
Pyrene				4 J	10	10	880 J	330		19000	330	
Simazine				330	0.06	4.0						
Simetryn				0.04	0.07							
Terbuthylazine				1.4								
1,2,4-Trichlorobenzene				4	10	700				4.0 J	330	

* = Present in laboratory blank
* = These are based on human health and environmental risk assessment criteria developed for screening purposes, or applicable state or federal requirements.
J = Analyzed below detection limit
BR = Bedrock (including zone weathered bedrock)
\+ = Maximum concentration may be a one-time measurement. Values compiled from both recent and historic data, checked against Rocky Flats Environmental Data System.
++ = Value given is detection or quantitation limit for analyte, in accordance with Statement of Work for General Radiochemistry and Routine Analytical Services Protocol (G.R.R.A.S.P.), v 1.1 1990, EG&G Rocky Flats Environmental Restoration Program.
(a) = Plutonium 238 + 239 + 240
(b) = Radium 226 + 228
(c) = Ammonia as N
(d) = Sum of polychlorinated biphenyls (PCBs) in water

! = Source: U.S. Department of Energy March 1992. Annual Report for Treatability Studies at Rocky Flats Plant Fiscal Year 1991
▲ = This table was reproduced precisely from a previous report.

TABLE C-1

ANALYTE CONCENTRATIONS FOR COMBINED OPERABLE UNITS 1 16 AND UPPER AND LOWER SOUTH INTERCEPTOR DITCHES
(Concluded)

Parameter	Groundwater			Surface Water			Soils			Sediments		
	Maximum*	Minimum**	Potential ARAR	Maximum*	Minimum**	Potential ARAR	Maximum*	Minimum**	Potential* ARAR	Maximum*	Minimum**	Potential ARAR
POLYCHLORINATED BIPHENYLS (PCBs) (µg/L)												
Aroclor-1254				12	1.0	1.0	440000		0.09	1600000	160	

NOTE: Analytical data received prior to October 1988 not subjected to validation procedure. Some of the chemical values reported in this table have not yet been validated, and the analyte list may be changed after the data are validated.

- = Present in laboratory blank
J = These are based on human health and environmental risk assessment criteria developed for screening purposes, or applicable state or federal requirements.
BR = Analyzed below detection limit
+ = Bedrock (including some weathered bedrock)
++ = Maximum concentration may be a one-time measurement. Values compiled from both recent and historic data, checked against Rocky Flats Environmental Data System.
(c) = Values given is detection or quantitation limit for analyst, in accordance with Statement of Work for General Radiochemistry and Routine Analytical Services Protocol (G R.R.A.S.P), v 1.1 1990, EG&G Rocky Flats Environmental Restoration Program.
(c)(c) = Plutonium 238 + 239 + 240
(c)(c)(c) = Radium 226 + 228
(d) = Ammonia as N
Sum of polychlorinated biphenyls (PCBs) in water
i = Source. U.S. Department of Energy March 1992. Annual Report for Treatability Studies at Rocky Flats Plant Fiscal Year 1991
▲ = This table was reproduced precisely from a previous report.

(4037-200-0004)(14-SS-B.T1)(11 10-92)

FIELD EXPERIENCE CHECKLIST
Environmental Restoration Management

Name:_____

Company Name _____

Telephone Number _____

Employee Number/Social Security Number (Subcontractors Only) _____

Project Name/Operable Unit Number _____

Field Experience Supervisor Name _____

Date supervisor completed OSHA Supervisor training _____

Date of field experience checklist completion _____

If employee is required to complete the 24-Hour OSHA course , then a 1 Day Field Experience is required.
If employee is required to complete the 40-Hour OSHA course , then a 3 Day Field Experience is required.

Circle the appropriate level of field experience required 1 Day # 009-691-01
3 Days # 018-691-07

Field experience consists of the completion of this checklist and supervision of the employee for 1 or 3 days, as identified.

Instructions for use

This checklist is designed to satisfy the Field Experience requirements of 29 CFR1910 120 (e)

The employee and the individual who will provide the direct supervision during the 1 or 3 days of field experience are to review this checklist together The supervisor will discuss the applicable areas to his/her work area If an item is not applicable, place N/A on the initial line After discussing each item on the back of this form the item is initialed by the supervisor The completed checklist will be signed and dated by the employee and supervisor

NOTE If an employee changes projects and/or Operable Units and new hazards/chemicals are introduced, then a review of the new information is required to be documented on another field experience form A reference to the original date of the field experience should be indicated on the second form Supervision of the employee for 1-3 days may not be required again

Return this form to Environmental Restoration Management (ERM) Training & Qualification Bldg 080

See back of form for the actual checklist

Initials Supervisor initials after each item is complete.	Action
1 _____	Verified current completion of the appropriate required initial OSHA training. 40-Hours or 24-Hours
2 _____	Completed Site-Specific briefing and/or Buffer Zone Indoctrination *(List items discussed during the briefing)*
3 _____	Completed a Required Reading form for the Site Specific Health and Safety Plan and/or ER Health and Safety Program Plan *(Required Reading forms are available through ERM Training & Qualification personnel)*
4 _____	Completed a review of the work plan and/or field sampling plan and applicable procedures *(Required Reading forms are available through ERM Training & Qualification personnel)* -Attended a Pre-Evolution briefing for project
5 _____	Discussed and ensured that the employee understood the following applicable topics -Site-specific health, safety, and other workplace hazards -Appropriate measures required to protect against workplace hazards -Site hazard/problem reporting procedure -Location of safety equipment -Proper personnel protective equipment procedures -Proper decontamination procedures -Proper Spill Response procedures -Proper Emergency Response actions
6 _____	Employee demonstrated the ability to safely follow applicable work procedures for the required_____ (8 OR 24 hours as appropriate)

I certify that I have completed this field experience with employee identified below

Printed Name/Signature of Employee/Date	Printed Name/Signature of Supervisor/Date
_____	_____

Historical Air Monitoring Results

Results of air monitoring surveys conducted at wells in the Groundwater Monitoring Program have been compiled for utilization in determining future air monitoring and PPE requirements at these wells Table E-1 lists all wells currently included in the program Table E-2 provides results of air monitoring at all wells, upon opening and after venting Background, breathing zone, and well head readings are also provided in Table E-2 Table E-3 provides similar data, but only for wells with positive readings Additionally, variances between background and breathing zone or well head readings are provided in Table E-3

Following is an explanation of codes utilized in Tables E-1, E-2, and E-3

Well ID	Identification number for well
Status	Sample = well is included in the sampling program WLM = well is included only in the Water Level Measurement program ND = well has not been developed
Year	Year in which air monitoring was conducted
Qtr	Quarter in which air monitoring was conducted
Survey Results	Results of air monitoring survey, as provided by air HNu PA-101 photoionization detector All results provided in parts per million (ppm)
	At opening = air monitoring results from survey conducted immediately after opening the well casing cap
	BG = Background Reading from survey conducted in airspace upwind and away from well
	BZ = Breathing Zone Reading from survey conducted in the field crew breathing zone
	WH = Wellhead. Reading from survey conducted at the top of the well casing
	BZ Diff = Breathing Zone Difference Variance between background and breathing zone readings Negative value indicates that the breathing zone reading was below the background reading
	WH Diff = Wellhead Difference Variance between background and wellhead readings Negative value indicates that the wellhead reading was below the background reading

TABLE E-1
ROCKY FLATS GROUNDWATER WELLS
RESEARCHED FOR
AIR MONITORING DATA

Well ID	Status	Well ID	Status	Well ID	Status	Well ID	Status	Well ID	Status	Well ID	Status	Well ID	Status
5070	WLM	1487BR	SAMPLE	B203789	WLM	P114989	SAMPLE	04591	SAMPLE	38291	SAMPLE	43993	WLM
5074	WLM	1587	SAMPLE	B203889	WLM	P115089	SAMPLE	04691	SAMPLE	38591	SAMPLE	44893	WLM
5174	WLM	1687BR	SAMPLE	B203989	WLM	B315289	WLM	04891	WLM	38891	SAMPLE	44993	WLM
5274	WLM	1887BR	SAMPLE	B204089	WLM	P115489	SAMPLE	04991	SAMPLE	38991	SAMPLE	45093	WLM
5374	WLM	1987	SAMPLE	B204189	WLM	P115589	SAMPLE	05091	SAMPLE	39191	SAMPLE	45293	WLM
5474	WLM	2087BR	WLM	B304789	WLM	P115689	SAMPLE	05191	SAMPLE	39291	SAMPLE	45393	WLM
5774	WLM	2187	SAMPLE	B304889	WLM	P215789	SAMPLE	05291	ND	39691	SAMPLE	45593	WLM
5874	WLM	2287BR	SAMPLE	B304989	WLM	P415889	SAMPLE	05391	SAMPLE	40491	WLM	45693	WLM
5974	WLM	2387BR	WLM	B405189	WLM	P415989	SAMPLE	05691	SAMPLE	40791	WLM	45793	WLM
6074	WLM	2487	SAMPLE	B405289	WLM	P416089	SAMPLE	05991	WLM	40991	WLM	45893	WLM
6174	WLM	2587BR	SAMPLE	B305389	WLM	P416189	SAMPLE	06091	SAMPLE	41091	SAMPLE	45993	WLM
6274	WLM	2687	WLM	B405489	WLM	P416289	SAMPLE	06191	SAMPLE	41491	SAMPLE	46093	WLM
6374	WLM	2787	WLM	B205589	WLM	P416389	SAMPLE	06291	SAMPLE	41591	SAMPLE	46193	WLM
0186	SAMPLE	2887BR	SAMPLE	B405689	WLM	P416489	SAMPLE	06391	WLM	41691	SAMPLE	46293	WLM
0386	SAMPLE	2987	SAMPLE	B405789	WLM	P416589	SAMPLE	06491	SAMPLE	45391	SAMPLE	46393	WLM
0586	SAMPLE	3087BR	SAMPLE	B405889	WLM	P416689	SAMPLE	06591	SAMPLE	03092	ND	46493	WLM
0686	WLM	3187BR	SAMPLE	B405989	WLM	P416789	SAMPLE	06691	SAMPLE	03192	ND	51193	SAMPLE
0786	SAMPLE	3287	WLM	B106089	SAMPLE	P416889	SAMPLE	06791	SAMPLE	10092	SAMPLE	58793	SAMPLE
0886	SAMPLE	3387	SAMPLE	B206289	SAMPLE	P416989	SAMPLE	06891	SAMPLE	10192	SAMPLE	59093	ND
0986	SAMPLE	3487BR	SAMPLE	B206489	SAMPLE	B317189	WLM	06991	SAMPLE	10292	SAMPLE	59393	SAMPLE
1086	SAMPLE	3587	WLM	B206589	SAMPLE	B217289	SAMPLE	07191	SAMPLE	10392	SAMPLE	59493	SAMPLE
1386	SAMPLE	3687BR	SAMPLE	B206689	SAMPLE	B217489	WLM	07291	SAMPLE	10492	SAMPLE	59593	SAMPLE
1486	SAMPLE	3887	SAMPLE	B206789	SAMPLE	B217789	WLM	07391	SAMPLE	10592	SAMPLE	59793	ND
1586	SAMPLE	3987	SAMPLE	B206889	SAMPLE	P317989	WLM	07891	SAMPLE	10692	SAMPLE	61293	ND
1686	SAMPLE	4087	WLM	B206989	SAMPLE	P218089	WLM	07991	SAMPLE	10792	SAMPLE	63093	SAMPLE
1786	SAMPLE	4187BR	SAMPLE	B207089	SAMPLE	P218289	SAMPLE	08091	SAMPLE	10892	SAMPLE	70093	SAMPLE
1886	WLM	4287	SAMPLE	B207289	WLM	P218389	SAMPLE	08291	WLM	10992	SAMPLE	70193	SAMPLE
1986	SAMPLE	4387	WLM	P207389	SAMPLE	B218789	WLM	08391	WLM	11092	SAMPLE	70293	SAMPLE
2186	SAMPLE	4487	WLM	P207589	SAMPLE	P219189	SAMPLE	08491	WLM	43392	SAMPLE	70393	SAMPLE
2286	SAMPLE	4587BR	SAMPLE	P207689	SAMPLE	P119389	SAMPLE	08591	WLM	43492	SAMPLE	70493	SAMPLE
2386	SAMPLE	4787	WLM	P207789	SAMPLE	P219489	SAMPLE	08891	SAMPLE	46192	SAMPLE	70593	SAMPLE
2486	SAMPLE	4887	WLM	P207889	SAMPLE	P219589	SAMPLE	09091	SAMPLE	46292	SAMPLE	70693	SAMPLE
2586	SAMPLE	4987	WLM	P207989	SAMPLE	P419689	SAMPLE	09691	SAMPLE	46392	SAMPLE	70893	SAMPLE
2686	SAMPLE	5087	WLM	B208089	SAMPLE	P320089	SAMPLE	10991	SAMPLE	46492	SAMPLE	71193	SAMPLE
2786	SAMPLE	5187	SAMPLE	B208189	SAMPLE	B220189	WLM	11291	WLM	46692	SAMPLE	71493	SAMPLE
2986	WLM	5287	SAMPLE	B208289	SAMPLE	B220489	WLM	11491	WLM	46792	SAMPLE	71693	SAMPLE
3086	SAMPLE	5387	WLM	B208389	WLM	0190	SAMPLE	11691	SAMPLE	46892	SAMPLE	71893	SAMPLE
3186	WLM	5487	SAMPLE	B208489	WLM	0290	SAMPLE	11791	SAMPLE	49192	SAMPLE	72093	SAMPLE
3286	SAMPLE	5587	SAMPLE	B208589	WLM	0390	SAMPLE	11891	SAMPLE	49292	SAMPLE	72293	SAMPLE
3386	SAMPLE	5687	SAMPLE	B208689	SAMPLE	0590	WLM	12091	SAMPLE	50092	SAMPLE	72393	SAMPLE
3486	SAMPLE	5887	SAMPLE	B208789	WLM	0690	WLM	12191	SAMPLE	50192	ND	72493	ND
3586	SAMPLE	6087	SAMPLE	P208889	SAMPLE	0790	WLM	12291	SAMPLE	50292	ND		
3686	SAMPLE	6187	SAMPLE	P208989	SAMPLE	0990	WLM	12391	SAMPLE	75092	SAMPLE		
3786	SAMPLE	6287	WLM	P209089	SAMPLE	1490	SAMPLE	12491	SAMPLE	75292	SAMPLE		
3886	SAMPLE	6487	SAMPLE	P209189	WLM	00191	SAMPLE	12691	SAMPLE	75892	ND		
3986	SAMPLE	6587	SAMPLE	P209289	SAMPLE	00291	SAMPLE	12891	WLM	75992	SAMPLE		
4086	SAMPLE	6687	SAMPLE	P209389	SAMPLE	00391	SAMPLE	12991	SAMPLE	76192	ND		
4186	WLM	6887	SAMPLE	P209489	SAMPLE	00491	SAMPLE	13091	SAMPLE	76292	SAMPLE		
4286	SAMPLE	7087	SAMPLE	P209589	SAMPLE	00691	SAMPLE	13191	SAMPLE	76792	ND		
4386	SAMPLE	7187	SAMPLE	P209689	SAMPLE	00791	WLM	13291	SAMPLE	76992	ND		
4486	WLM	7287	SAMPLE	P209789	SAMPLE	00891	WLM	13391	SAMPLE	77192	ND		
4686	SAMPLE	B400089	WLM	P209889	SAMPLE	00991	WLM	13491	SAMPLE	77392	ND		
4786	SAMPLE	B400189	WLM	P209989	WLM	01291	SAMPLE	13591	WLM	77492	SAMPLE		
4886	SAMPLE	B400289	WLM	P210089	SAMPLE	01391	SAMPLE	20591	WLM	00193	ND		
4986	SAMPLE	B400389	WLM	P210189	SAMPLE	01491	SAMPLE	20691	WLM	00293	SAMPLE		
5086	SAMPLE	B400489	WLM	B210389	WLM	01791	SAMPLE	20791	WLM	00393	SAMPLE		
5186	SAMPLE	B200589	WLM	B210489	SAMPLE	01891	SAMPLE	30991	SAMPLE	00493	ND		
5286	WLM	B200689	WLM	B410589	SAMPLE	01991	SAMPLE	31491	WLM	05093	SAMPLE		
5386	SAMPLE	B200789	WLM	B410689	SAMPLE	02091	SAMPLE	31791	SAMPLE	05193	SAMPLE		
5486	WLM	B200889	WLM	B410789	SAMPLE	02191	WLM	31891	SAMPLE	05293	SAMPLE		
B405586	WLM	B201089	WLM	B110889	SAMPLE	02291	SAMPLE	32591	SAMPLE	05393	ND		
5686	SAMPLE	B201189	WLM	B110989	SAMPLE	02391	WLM	33491	SAMPLE	22093	SAMPLE		
5786	SAMPLE	B201289	WLM	B111189	SAMPLE	02491	SAMPLE	33691	WLM	22193	SAMPLE		
5886	WLM	B201589	WLM	B411289	SAMPLE	02591	SAMPLE	33891	SAMPLE	22293	SAMPLE		
6186	SAMPLE	B401989	WLM	B411389	SAMPLE	02691	SAMPLE	34591	WLM	22393	SAMPLE		
6286	SAMPLE	B302089	WLM	P313489	SAMPLE	02791	WLM	34791	SAMPLE	22593	SAMPLE		
6386	SAMPLE	B402189	WLM	P313589	SAMPLE	02891	WLM	35391	SAMPLE	23193	SAMPLE		
6486	SAMPLE	B102289	WLM	P213689	SAMPLE	02991	SAMPLE	35691	SAMPLE	23293	ND		
6586	SAMPLE	B102389	WLM	B213789	SAMPLE	03091	SAMPLE	35991	WLM	40193	WLM		
6686	SAMPLE	B202489	WLM	P213889	WLM	03191	WLM	36191	SAMPLE	40293	WLM		
6786	WLM	B202589	WLM	P213989	WLM	03391	SAMPLE	36391	SAMPLE	40393	WLM		
6886	SAMPLE	B402689	WLM	P314089	SAMPLE	03591	SAMPLE	36691	SAMPLE	40593	WLM		
7086	SAMPLE	B302789	WLM	P414189	SAMPLE	03691	SAMPLE	36991	WLM	41193	WLM		
0187	SAMPLE	B302889	WLM	P314289	SAMPLE	03791	SAMPLE	37191	SAMPLE	41693	WLM		
0487	SAMPLE	B302989	WLM	P114389	SAMPLE	03891	WLM	37591	SAMPLE	41993	WLM		
0587BR	SAMPLE	B303089	WLM	P114489	SAMPLE	03991	SAMPLE	37691	SAMPLE	42393	WLM		
0987	SAMPLE	B203189	WLM	P114589	SAMPLE	04091	SAMPLE	37791	SAMPLE	42993	WLM		
1087	SAMPLE	B203289	WLM	P114689	SAMPLE	04191	SAMPLE	37891	SAMPLE	43293	WLM		
1187	SAMPLE	B203489	WLM	P114789	SAMPLE	04291	SAMPLE	37991	SAMPLE	43593	WLM		
1287	SAMPLE	B203589	WLM	P114889	SAMPLE	04491	SAMPLE	38191	SAMPLE	43893	WLM		

TABLE E-2

ROCKY FLATS GROUNDWATER SAMPLING HNu READINGS

Well ID	Status	Year	Qtr	Survey Results						COMMENTS
				At Opening			After Venting			
				BG	BZ	WH	BG	BZ	WH	
5070	WLM	1994	2	0	0	0				
		1994	1	0	0	0				
5074	WLM	1994	2	0	0	0				
5174	WLM	1994	2	0	0	0				
5274	WLM	1994	2	0	0	0				
5374	WLM	1994	2	0	0	0				
		1993	4	5	5	5				
5474	WLM	1994	2	0	0	0				
		1996	4	5	5	5				
5774	WLM	1994	2	0	0	0				
5874	WLM	1994	2	0	0	0				
		1993	4	5	5	5				
5974	WLM	1994	2	0	0	0				
		1994	1	0	0	0				
		1993	4	5	5	5				
6074	WLM	1994	2	0	0	0				
6174	WLM	1994	2	0	0	0				
6274	WLM	1994	2	0	0	0				
		1993	4	5	5	5				
6374	WLM	1994	2	0	0	0				
		1993	4	4 2	4 2	4 2				
0186	SAMPLE	1994	2	0	0	0				
		1994	1	0	0	0				
		1993	4	0 4	0 4	0 4				
		1993	3	0 2	0 2	0 2				
		1993	2	0 2	0 2	0 2				
		1993	1	0 6	0 6	0 6				
		1992	3	0 1	0 1	0 1				
		1992	2	0 1	0 1	0 1				
0386	SAMPLE	1994	2	0	0	0				
		1994	1	0	0	0				
		1993	3	0 2	0 2	0 2				
		1993	2	0 2	0 2	0 2				
		1993	1	0 2	0 2	0 2				
		1992	3	0 2	0 2	0 2				
		1992	2	0 4	0 4	0 4				
		1992	1	0	0	0				
0586	SAMPLE	1994	2	0	0	0				
		1994	1	0 6	0 6	0 6				
		1993	4	1 2	1 2	3	0 2	0 2	0 2	
		1993	3	0 3	0 3	0 3				
		1993	1	0 6	0 6	0 6				
		1993	2	0 4	0 4	0 4				
		1992	3	0 4	0 4	0 4				
		1992	2	0 3	0 3	0 3				
0686	WLM	1994	2	0	0	0				
		1992	3	0 2	0 2	0 2				
		1992	2	0 4	0 4	0 4				
		1992	1	0 2	0 2	0 2				
		1991	4	0 2	0 2	0 2				
		1991	3	0 3	0 3	0 3				
		1991	2	2	1 8	0 4				
0786	SAMPLE	1994	2	0	0	0				
		1994	1	10 8	10 8	10 8				
		1993	4	0 2	0 2	0 2				

TABLE E-2

ROCKY FLATS GROUNDWATER SAMPLING HNu READINGS

Well ID	Status	Year	Qtr	Survey Results						COMMENTS
				At Opening			After Venting			
				BG	BZ	WH	BG	BZ	WH	
		1993	4	0 3	0 3	0 3				
		1993	3	0 2	0 2	0 2				
		1993	2	0 4	0 4	0 4				
		1993	1	0 3	0 3	0 3				
		1992	3	0 2	0 2	0 2				
		1992	2	0 4	0 4	0 3				
1786	SAMPLE	1994	2	0	0	0				
		1994	1	0	0	0				
		1993	4	0 2	0 2	0 2				
		1993	3	0 2	0 2	0 2				
		1993	2	0	0	0				
		1993	1	0 6	0 6	0 6				
		1992	3	0 2	0 2	0 2				
		1992	2	0 4	0 4	0 4				
1886	WLM	1994	2	0	0	0				
		1994	1	5 8	5 9	5 9				No venting data
		1993	2	0 1	0 1	0 1				
		1992	3	0 3	0 3	0 4	0 6	0 6	0 4	
		1992	2	0 4	0 4	0 4				
		1992	1	0 3	0 2	0 2				
		1991	4	0 3	0 3	0 3				
		1991	3	0 2	0 2	0 2				
1986	SAMPLE	1994	2	0	0	0				
		1994	1	0	0	0				
		1993	4	0 4	0 4	0 4				
		1993	2	0 1	0 1	0 1				
		1992	3	0 4	0 4	0 4				
		1992	2	0 3	0 3	0 3				
		1992	1	0 4	0 4	0 4				
		1991	4	0 4	0 4	0 9	0 2	0 2	0 2	
2186	SAMPLE	1994	2	0	0	0				
		1994	1	4 4	4 4	4 4				
		1993	4	0 4	0 4	0 4				
		1993	3	0 3	0 3	0 3				
		1992	2	0 3	0 3	0 3				
		1992	1	0 4	0 4	0 4				
		1991	4	0 4	0 4	0 4				
		1991	2	0 2	0 2	0 2				
2286	SAMPLE	1994	2	0	0	0				
		1994	1	3 6	3 6	3 6				
		1993	4	0 4	0 4	0 4				
		1993	3	0 3	0 3	0 3				
		1993	1	0 4	0 4	0 4				
		1992	3	0 3	0 3	0 3				
		1992	2	0 3	0 3	0 3				
		1992	1	0 4	0 2	0 2				
2386	SAMPLE	1994	2	0	0	0				
		1994	1	3 2	3 2	3 2				
		1993	4	0 5	0 5	0 5				
		1993	3	0 3	0 3	0 3				
		1993	2	0 3	0 3	0 3				
		1993	1	0 4	0 4	0 4				
		1992	3	0 3	0 3	0 3				
		1992	2	0 3	0 3	0 3				
2486	SAMPLE	1994	2	0	0	0				

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ROCKY FLATS GROUNDWATER SAMPLING HNu READINGS

Well ID	Status	Year	Qtr	Survey Results						COMMENTS
				At Opening			After Venting			
				BG	BZ	WH	BG	BZ	WH	
		1994	1	2 3	2 3	2 3				
		1993	3	0 3	0 3	0 3				
		1993	2	0 3	0 3	0 3				
		1993	1	0 2	0 2	0 2				
		1992	3	0 3	0 3	0 3				
		1992	2	0 3	0 3	0 3				
		1992	1	0 2	0 2	0 2				
3386	SAMPLE	1994	2	0	0	0				
		1994	1	0 6	0 6	0 6				
		1993	3	0 3	0 3	0 3				
		1993	2	0 1	0 1	0 1				
		1992	3	0 3	0 3	0 3				
		1992	2	0 3	0 3	0 3				
		1992	1	0 2	0 2	0 2				
		1991	4	0 2	0 2	0 2				
3486	SAMPLE	1994	2	0	0	0				
		1994	1	0	0	0				
		1993	3	0 3	0 3	0 3				
		1993	2	0 4	0 4	0 4				
		1992	3	0 4	0 4	0 3				
		1992	2	0 8	0 8	0 8				
		1992	1	0 2	0 2	0 2				
		1991	4	0 2	0 2	0 2				
3586	SAMPLE	1994	2	0	0	0				
		1994	1	0 3	0 3	0 3				
		1993	3	0 2	0 2	0 2				
		1993	2	0 2	0 2	0 2				
		1992	3	0 3	0 3	0 2				
		1992	2	0 8	0 8	0 8				
		1992	1	0 2	0 2	0 2				
		1991	4	0 3	0 3	0 3				
3686	SAMPLE	1994	2	0	0	0				
		1994	1	5 5	5 6	5 7				No venting data
		1993	3	0 1	0 1	0 1				
		1993	2	0 4	0 4	0 4				
		1993	1	0 6	0 6	0 6				
		1992	3	0 2	0 2	0 2				
		1992	2	0 4	0 4	0 4				
		1992	1	0 2	0 2	0 2				
3786	SAMPLE	1994	2	0	0	0				
		1994	1	1 8	1 8	1 8				
		1993	3	0 3	0 3	0 3				
		1993	2	0 6	0 6	0 6				
		1993	1	0 6	0 6	0 6				
		1992	3	0 3	0 3	0 2				
		1992	2	0 4	0 4	0 3				
		1992	1	0 2	0 2	0 2				
3886	SAMPLE	1994	2	0	0	0				
		1994	1	5 9	6	6 2				No venting data
		1993	4	0 2	0 2	0 2				
		1993	3	0 1	0 1	0 1				
		1993	2	0 4	0 4	0 4				
		1993	1	0 4	0 4	0 4				
		1992	3	0 2	0 2	0 2				
		1992	2	0 4	0 4	0 4				

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ROCKY FLATS GROUNDWATER SAMPLING HNu READINGS

Well ID	Status	Year	Qtr	Survey Results						COMMENTS
				At Opening			After Venting			
				BG	BZ	WH	BG	BZ	WH	
		1992	2	0 7	0 7	0 7				
4786	SAMPLE	1994	2	0	0	0				
		1994	1	2	2	2				
		1993	4	2 2	2 2	2 2				
		1993	3	0 3	0 3	0 3				
		1993	2	0 2	0 2	0 2				
		1992	3	0 9	0 9	0 9				
		1992	2	0 5	0 5	0 5				
		1992	1	0 2	0 2	0 2				
4886	SAMPLE	1994	2	0	0	0				
		1994	1	1 9	1 9	1 9				
		1993	4	0 4	0 4	0 4				
		1993	3	0 2	0 2	0 2				
		1993	2	0 4	0 4	0 4				
		1993	1	0 5	0 5	0 5				
		1992	3	2 8	2 8	2 8				
		1992	2	0 5	0 5	0 5				
4986	SAMPLE	1994	2	0	0	0				
		1994	1	5	5	5				
		1993	4	0 4	0 4	0 4				
		1993	3	0 2	0 2	0 2				
		1993	2	0 3	0 3	0 3				
		1993	1	0 2	0 2	0 2				
		1992	3	0 5	0 5	0 5				
		1992	2	0 6	0 6	0 5				
5086	SAMPLE	1994	2	0	0	0				
		1994	1	3	3	3				
		1993	3	0 2	0 2	0 2				
		1993	2	0 2	0 2	0 2				
		1993	1	0 3	0 3	0 3				
		1992	3	0 7	0 7	0 7				
		1992	2	0 8	0 8	0 8				
		1992	1	0 2	0 2	0 2				
5186	SAMPLE	1994	2	0	0	0				
		1994	1	5 7	5 7	5 7				
		1993	4	2 1	2 1	2 1				
		1993	3	0 2	0 2	0 2				
		1992	3	0 4	0 4	0 4				
		1992	2	0 6	0 6	0 6				
		1992	1	0 2	0 2	0 2				
		1991	4	0 2	0 2	0 2				
5286	WLM	1994	2	0	0	0				
		1994	1	1	1	1				
		1993	1	0 2	0 2	0 2				
		1992	3	0 4	0 4	0 4				
		1992	2	0 6	0 6	0 6				
		1992	1	0 2	0 2	0 2				
		1991	4	0 2	0 2	0 2				
		1991	3	0 2	0 2	0 2				
5386	SAMPLE	1994	2	0	0	0				
		1994	1	0 2	0 2	0 2				
		1993	2	0 3	0 3	0 3				
		1993	2	0 4	0 4	0 4				
		1993	1	0 6	0 6	0 6				
		1992	3	3 2	3 2	3 2				

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ROCKY FLATS GROUNDWATER SAMPLING HNu READINGS

Well ID	Status	Year	Qtr	Survey Results						COMMENTS
				At Opening			After Venting			
				BG	BZ	WH	BG	BZ	WH	
		1992	3	0 4	0 4	0 4				
		1992	2	4	4	4				
		1992	1	0 1	0 1	0 1				
6386	SAMPLE	1994	2	0	0	0				
		1994	1	0 2	0 2	0 2				
		1993	3	0 2	0 2	0 2				
		1993	2	0 2	0 2	0 2				
		1992	3	2 4	2 4	2 4				
		1992	2	4	4	4				
		1992	1	0 2	0 2	0 2				
		1991	4	0 2	0 2	0 1				
6486	SAMPLE	1994	2	0	0	0				
		1994	1	1	1	1				
		1993	3	0 2	0 2	0 2				
		1993	2	0 3	0 3	0 3				
		1993	1	0 2	0 2	0 2				
		1992	3	0 4	0 4	0 4				
		1992	2	0 8	0 8	0 8				
		1992	1	0 2	0 2	0 2				
6586	SAMPLE	1994	2	0	0	0				
		1994	1	0 2	0 2	0 2				
		1993	3	0	0	0				
		1993	1	0 7	0 7	0 7				
		1992	3	0 2	0 2	0 2				
		1992	2	0 6	0 6	0 6				
		1992	1	0 2	0 2	0 2				
		1991	4	0 1	0 1	0 1				
6686	SAMPLE	1994	2	0	0	0				
		1994	1	0 2	0 2	0 2				
		1993	4	0 2	0 2	0 2				
		1993	3	0 3	0 3	0 3				
		1993	2	0 2	0 2	0 2				
		1993	1	0 6	0 6	0 6				
		1992	3	0 2	0 2	0 2				
		1992	2	0 7	0 7	0 7				
6786	WLM	1994	2	0	0	0				
		1993	2	0 1	0 1	0 1				
		1992	3	0 3	0 3	0 3				
		1992	2	0 7	0 7	0 4				
		1991	4	0 2	0 2	0 1				
		1991	3	0 2	0 2	0 2				
		1991	2	0 2	0 2	0 2				
6886	SAMPLE	1994	2	0	0	0				
		1994	1	0 2	0 2	0 2				
		1993	2	0 2	0 2	0 2				
		1993	1	0 2	0 2	0 2				
		1992	3	0 3	0 3	0 3				
		1992	2	0 3	0 3	0 3				
		1992	1	0 1	0 1	0 1				
		1991	4	0 2	0 2	0 2				
7086	SAMPLE	1994	2	0	0	0				
		1994	1	0 2	0 2	0 2				
		1993	3	0 5	0 5	0 5				
		1993	2	0 3	0 3	0 3				
		1993	1	0 9	0 9	0 9				

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ROCKY FLATS GROUNDWATER SAMPLING HNu READINGS

Well ID	Status	Year	Qtr	Survey Results						COMMENTS
				At Opening			After Venting			
				BG	BZ	WH	BG	BZ	WH	
		1992	3	0 2	0 2	0 3	0 4	0 4	1 2	Day 2
		1992	2	0 4	0 4	1 2	0 3	0 3	0 3	Day 2
		1992	1	0 1	0 1	0 4	0 3	0 3	0 3	
		1991	4	0 1	0 1	0 2	0 3	0 3	0 3	
1487BR	SAMPLE	1994	2	0	0	0				
		1994	1	5 4	5 4	5 4				
		1993	3	0 2	0 2	0 2				
		1993	2	0 2	0 2	0 2				
		1993	1	0 6	0 6	0 6				
		1992	3	0 3	0 3	0 3				
		1992	2	0 4	0 4	0 4				
		1992	1	0 1	0 1	0 1				
1587	SAMPLE	1994	2	0	0	0				
		1994	1	1 4	1 4	3	2 5	2 5	2 5	
		1993	4	0 2	0 2	0 2				
		1993	3	0 2	0 2	0 2				
		1993	2	0 4	0 4	0 4				
		1993	1	0 5	0 5	0 5				
		1992	3	0 4	0 4	0 4				
		1992	2	0 2	0 4	0 4	4	4	4	
1687BR	SAMPLE	1994	2	0	0	0				
		1994	1	1	1	1				
		1993	4	0 3	0 3	0 3				
		1993	3	0 1	0 1	0 1				
		1993	2	0 2	0 2	0 2				
		1993	1	0 3	0 3	0 3				
		1992	3	0 4	0 4	0 4				
		1992	2	0 2	0 4	0 4	3 8	3 8	3 8	
1887BR	SAMPLE	1994	2	0	0	0				
		1994	1	0 2	0 2	0 2				
		1993	4	0	0	0				
		1993	2	0 4	0 4	0 4				
		1992	3	0 2	0 2	0 2				
		1992	2	0 4	0 4	0 4				
		1992	1	0 3	0 3	0 3				
		1991	4	0 2	0 2	0 2				
1987	SAMPLE	1994	2	0	0	0				
		1994	1	8 5	8 5	8 5				
		1993	3	0 2	0 2	0 2				
		1993	2	0 4	0 4	0 4				
		1992	3	0 3	0 3	0 3				
		1992	2	0 2	0 2	0 4	0 1	0 1	0 2	Day 2
		1992	1	0 4	0 4	1 4				No venting data
		1991	3	0 2	0 3	0 3	0 3	0 3	0 3	
2087BR	WLM	1994	2	0	0	0				
		1994	1	7 7	7 7	7 7				
		1992	3	0 3	0 3	0 3				
		1992	2	0 2	0 2	0 2				
		1992	1	0 4	0 4	0 4				
		1991	4	0	0	0				
		1991	3	0 2	0 2	0 2				
		1991	2	0 2	0 2	0 2				
2187	SAMPLE	1994	2	0	0	0				
		1994	1	0 3	0 3	0 3				
		1993	3	0 3	0 3	0 3				

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ROCKY FLATS GROUNDWATER SAMPLING HNu READINGS

Well ID	Status	Year	Qtr	Survey Results						COMMENTS
				At Opening			After Venting			
				BG	BZ	WH	BG	BZ	WH	
		1993	4	4	4	4				
		1993	3	0 3	0 3	0 3				
		1993	2	0 3	0 3	0 3				
		1993	1	0 3	0 3	0 3				
		1992	3	0 2	0 2	0 2				
		1992	2	0 6	0 6	0 6				
2987	SAMPLE	1994	2	0	0	0				
		1994	1	5	5	6				No venting data
		1993	3	0 3	0 3	0 3				
		1993	2	0 1	0 1	0 1				
		1993	1	0 4	0 4	0 4				
		1992	3	0 3	0 3	0 3				
		1992	2	0 5	0 5	0 5				
		1992	1	0 1	0 1	0 1				
3087BR	SAMPLE	1994	2	0	0	0				
		1994	1	2 5	2 5	2 5				
		1993	4	0 2	0 2	0 2				
		1993	3	0 3	0 3	0 3				
		1993	2	0 1	0 1	0 1				
		1993	1	0 4	0 4	0 4				
		1992	3	0 3	0 3	0 3				
		1992	2	0 5	0 5	0 5				
3187BR	SAMPLE	1994	2	0	0	0				
		1994	1	0 2	0 2	0 2				
		1993	4	0 4	0 4	0 4				
		1993	3	0 3	0 3	0 3				
		1993	2	0 2	0 2	0 2				
		1993	1	0 2	0 2	0 2				
		1992	3	0 3	0 3	0 2				
		1992	2	0 4	0 4	0 4				
3287	WLM	1994	2	0	0	0				
		1992	3	0 3	0 3	0 3				
		1992	2	0 4	0 4	0 4				
		1992	1	0 3	0 3	0 3				
		1991	4	0 3	0 3	0 3				
		1991	3	0 1	0 1	0 1				
		1991	2	0 8	0 6	0 4				
		1991	1	0 3	0 3	0 3				
3387	SAMPLE	1994	2	0	0	0				
		1994	1	0 8	0 8	0 8				
		1992	3	0 2	0 2	0 2				
		1992	2	0 4	0 4	0 4				
		1992	1	0 2	0 2	0 2				
		1991	4	0 1	0 1	0 1				
		1991	3	0	0	0				
		1991	2	0 2	0 2	0 2				
3487BR	SAMPLE	1994	2	0	0	0				
		1994	1	0 2	0 2	0 2				
		1993	4	0 4	0 4	0 4				
		1993	3	0 3	0 3	0 3				
		1993	2	0 6	0 6	0 6				
		1993	1	0 2	0 2	0 2				
		1992	3	0 2	0 2	0 2				
		1992	2	0 4	0 4	0 4				
3587	WLM	1994	2	0	0	0				

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ROCKY FLATS GROUNDWATER SAMPLING HNu READINGS

Well ID	Status	Year	Qtr	Survey Results						COMMENTS
				At Opening			After Venting			
				BG	BZ	WH	BG	BZ	WH	
		1993	2	0 2	0 2	0 2				
		1992	1	0 1	0 1	0 1				
		1992	3	0 4	0 4	0 4				
		1992	2	0 5	0 5	250				No venting data
		1991	4	0 2	0 2	0 2				
		1991	3	0 3	0 3	0 3				
		1991	2	0 4	0 4	0 8	0 2	0 2	0 2	
4487	WLM	1994	2	0	0	0				
		1994	1	5 5	5 5	5 5				
		1992	3	0 2	0 2	0 2				
		1992	2	4	4	17	0 6	0 6	0 6	
		1992	1	0 2	0 2	0 2				
		1991	4	0 2	0 2	0 2				
		1991	3	0 1	0 1	0 1				
		1991	2	0 4	0 4	0 4				
4587BR	SAMPLE	1994	2	0	0	0				
		1994	1	2 8	2 8	2 8				
		1993	3	0 3	0 3	0 3				
		1993	2	0 2	0 2	0 2				
		1993	1	0 6	0 6	0 6				
		1992	3	0 3	0 3	0 3				
		1992	2	4	4	4 5	0 2	0 2	0 2	
		1992	1	0 2	0 2	0 2				
4787	WLM	1994	2	0	0	0				
		1994	1	0 5	0 5	0 5				
		1992	3	0 3	0 3	0 3				
		1992	2	0 4	0 4	0 4				
		1992	1	0 2	0 2	0 2				
		1991	4	0	0	0				
		1991	3	0 1	0 1	0 1				
		1991	2	2 2	2 2	2 2				
4887	WLM	1994	2	0	0	0				
		1994	1	5 8	5 8	5 8				
		1993	1	0 9	0 9	0 9				
		1992	3	0 3	0 3	0 3				
		1992	2	0 4	0 4	0 4				
		1992	1	0 3	0 3	0 3				
		1991	4	0 2	0 2	0 2				
		1991	3	0 1	0 1	0 1				
4987	WLM	1994	2	0	0	0				
		1994	1	5 2	5 2	5 2				
		1992	3	0 3	0 3	0 3				
		1992	2	0 2	0 2	0 2				
		1992	1	0 2	0 2	0 2				
		1991	4	0 2	0 2	0 2				
		1991	3	0 1	0 1	0 1				
		1991	2	2 5	2 5	2 5				
5087	WLM	1994	2	0	0	0				
		1994	1	5 2	5 2	5 2				
		1992	3	0 3	0 3	0 3				
		1992	2	4	4	4 5				No venting data
		1992	1	0 1	0 1	0 1				
		1991	4	0 2	0 2	0 2				
		1991	3	0 1	0 2	0 2				No venting data
		1991	2	2 4	2 4	2 4				

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ROCKY FLATS GROUNDWATER SAMPLING HNu READINGS

Well ID	Status	Year	Qtr	Survey Results						COMMENTS
				At Opening			After Venting			
				BG	BZ	WH	BG	BZ	WH	
		1992	2	0 4	0 4	0 4				
6087	SAMPLE	1994	2	0	0	0				
		1994	1	1	1	1				
		1993	4	0 5	0 5	0 5				
		1993	3	0 2	0 2	0 2				
		1993	1	0 5	0 5	0 5				
		1992	3	0 1	0 1	0 1				
		1992	2	1 4	1 4	3 8	0 2	0 2	0 2	
		1992	1	0 3	0 2	0 1				
6187	SAMPLE	1994	2	0	0	0				
		1994	1	1	1	1				
		1993	4	0	0 2	0 2				1% EXP
		1993	4	0 2	0 2	0 2				
		1993	3	0 2	0 2	0 2				
		1993	1	0 2	0 6	0 6				
		1992	3	0 1	0 1	0 1				
		1992	2	1 2	1 2	1 2				
6287	WLM	1994	2	0	0	0				
		1993	1	0 2	0 2	0 2				
		1992	3	0 1	0 1	0 3	0 3	0 3	0	
		1992	2	1 2	1 2	3 8	0 2	0 2	0 2	
		1992	1	0 2	0 2	0 1				
		1991	4	0 3	0 3	0 3				
		1991	3	0 4	0 4	0 4				
		1991	2	1 5	1 5	1 4				
6487	SAMPLE	1994	2	0	0	0				
		1994	1	2 6	2 6	2 6				
		1993	4	0 3	0 3	0 3				
		1993	3	0 3	0 3	0 3				
		1993	1	0 8	0 8	0 8				
		1992	3	0 1	0 1	0 1				
		1992	2	0 4	0 4	0				
		1992	1	0 2	0 2	0 2				
6587	SAMPLE	1994	2	0	0	0				
		1994	1	2 9	2 9	2 9				
		1993	4	0 1	0 1	0 1				
		1993	1	0 4	0 4	0 4				
		1993	3	0 3	0 3	0 3				
		1992	3	0 2	0 2	0 2				
		1992	2	0 6	0 6	0 6				
		1992	1	0 3	0 2	0 2				
6687	SAMPLE	1994	2	0	0	0				
		1994	1	2 6	2 6	2 6				
		1993	4	0 2	0 2	0 2				
		1993	3	0 3	0 3	0 3				
		1993	2	0 3	0 3	0 3				
		1992	3	0 2	0 2	0 2				
		1992	2	0 4	0 4	0 4				
		1992	1	0 3	0 2	0 2				
6887	SAMPLE	1994	2	0	0	0				
		1994	1	7 2	7 2	7 2				
		1993	4	0 2	0 2	0 2				
		1993	3	0 1	0 1	0 1				
		1992	3	0 1	0 1	0 1				
		1992	2	1 6	1 6	1 6				

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ROCKY FLATS GROUNDWATER SAMPLING HNu READINGS

Well ID	Status	Year	Qtr	Survey Results						COMMENTS
				At Opening			After Venting			
				BG	BZ	WH	BG	BZ	WH	
		1992	2	0 5	0 5	0 5				
		1992	1	0	0	0				
		1991	4	0 2	0 2	0 2				
		1991	3	0 2	0 2	0 2				
B200589	WLM	1994	2	0	0	0				
		1993	2	0 6	0 6	0 6				
		1993	1	0 4	0 4	0 4				
		1992	3	0 6	0 6	0 6				
		1992	2	0 5	0 5	0 5				
		1992	1	0 2	0 2	0 2				
		1991	4	0 2	0 2	0 2				
		1991	3	0 2	0 2	0 2				
B200689	WLM	1994	2	0	0	0				
		1993	2	0 4	0 4	0 4				
		1992	3	1 5	1 5	1 5				
		1992	2	0 5	0 5	0 5				
		1992	1	0 2	0 2	0 2				
		1991	4	0 2	0 2	0 2				
		1991	3	0 2	0 2	0 2				
		1991	2	3	2	2				
B200789	WLM	1994	2	0	0	0				
		1993	2	0 3	0 3	0 3				
		1993	1	0 2	0 2	0 2				
		1992	3	1 7	1 7	1 7				
		1992	2	0 4	0 4	0 4				
		1992	1	0 4	0 4	0 4				
		1991	4	0 3	0 3	0 3				
		1991	3	0 2	0 2	0 2				
B200889	WLM	1994	2	0	0	0				
		1993	2	0 6	0 6	0 6				
		1992	3	1 7	1 7	1 7				
		1992	2	0 3	0 3	0 3				
		1992	1	0 2	0 2	0 2				
		1991	4	0 3	0 3	0 3				
		1991	3	0 2	0 2	0 2				
		1991	2	2	2	2				
B201089	WLM	1994	2	0	0	0				
		1993	1	0 4	0 4	0 4				
		1992	3	0 9	0 9	0 9				
		1992	2	0 5	0 5	0 5				
		1992	1	4 2	4 2	4 2				
		1991	4	0 2	0 2	0 2				
		1991	3	0 2	0 2	0 2				
		1991	2	2	2	2				
B201189	WLM	1994	2	0	0	0				
		1993	1	0 8	0 8	2 5	0 5	0 5	0 5	
		1992	3	2	2	2				
		1992	2	0 8	0 8	100	0 8	0 8	0 8	
		1992	1	0	0	0				
		1991	4	0 2	0 2	0 2				
		1991	3	0 2	0 2	0 2				
		1991	2	2	2	2				
B201289	WLM	1994	2	0	0	0				
		1993	1	0 4	0 4	0 4				
		1992	3	2 8	2 8	2 8				

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ROCKY FLATS GROUNDWATER SAMPLING HNu READINGS

Well ID	Status	Year	Qtr	Survey Results						COMMENTS
				At Opening			After Venting			
				BG	BZ	WH	BG	BZ	WH	
		1992	2	65	62	58				
		1992	1	0	0	0				
		1991	4	04	04	04				
		1991	3	02	02	02				
		1991	2	2	2	2				
B202589	WLM	1994	2	0	0	0				
		1993	1	03	03	05	04	04	04	
		1992	3	24	24	24				
		1992	2	12	12	4	05	05	05	
		1992	1	0	0	0				
		1991	4	02	02	02				
		1991	3	02	02	03				No venting data
		1991	2	02	02	02				
B402689	WLM	1994	2	0	0	0				
		1993	2	02	02	02				
		1992	3	36	36	36				
		1992	2	02	02	02				
		1992	1	04	04	04				
		1991	4	02	02	02				
		1991	3	02	02	02				
		1991	2	02	02	02				
B302789	WLM	1994	2	0	0	0				
		1993	1	02	02	02				
		1992	3	02	02	28	02	03	03	Day 2
		1992	2	04	04	04				
		1992	1	0	0	0				
		1991	4	015	015	015				
		1991	3	02	02	02				
		1991	2	02	02	0				
B302889	WLM	1994	2	0	0	0				
		1993	1	04	04	04				
		1992	3	28	28	28				
		1992	2	03	03	03				
		1992	1	0	0	0				
		1991	4	01	01	01				
		1991	3	03	03	03				
		1991	2	03	03	03				
B302989	WLM	1994	2	0	0	0				
		1992	3	28	28	28				
		1992	2	07	07	06				
		1992	1	0	0	0				
		1991	4	02	02	02				
		1991	3	03	03	03				
		1991	2	03	03	03				
		1991	1	02	03	03				No venting data
B303089	WLM	1994	2	0	0	0				
		1994	1	07	07	07				
		1993	4	04	04	03				
		1993	1	03	03	03				
		1992	3	01	01	01				
		1992	2	48	48	48				
		1992	1	0	0	0				
		1991	4	01	01	01				
B203189	WLM	1994	2	0	0	0				
		1993	2	04	04	04				

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ROCKY FLATS GROUNDWATER SAMPLING HNu READINGS

Well ID	Status	Year	Qtr	Survey Results						COMMENTS
				At Opening			After Venting			
				BG	BZ	WH	BG	BZ	WH	
		1994	1	68	68	68				
		1993	1	03	03	03				
		1992	3	05	05	05				
		1992	2	1	1	12	04	04	04	
		1992	1	4	4	48	03	03	03	
		1991	4	03	03	03				
		1991	3	02	02	04				
B204189	WLM	1994	2	0	0	0				
		1994	1	8	8	8				
		1993	1	05	05	05				
		1992	3	05	05	05				
		1992	2	1	12	08	04	04	04	
		1992	1	4	4	5	03	03	03	
		1991	4	03	03	03				
		1991	3	02	02	02				
B304789	WLM	1994	2	0	0	0				
		1993	4	02	02	02				
		1993	2	03	03	03				
		1993	1	06	06	06				
		1992	3	03	03	03				
		1992	2	07	07	05				
		1992	1	0	0	0				
		1991	4	01	01	01				
B304889	WLM	1994	2	0	0	0				
		1993	2	03	03	03				
		1993	1	04	04	04				
		1992	3	28	28	28				
		1993	2	34	34	34				
		1993	1	0	0	0				
		1991	4	01	01	01				
		1991	3	03	03	03				
B304989	WLM	1994	2	0	0	0				
		1993	2	03	03	03				
		1993	1	03	03	03				
		1992	3	28	28	28				
		1992	2	33	33	33				
		1992	1	0	0	0				
		1991	4	01	01	01				
		1991	3	02	02	02				
B405189	WLM	1994	2	0	0	0				
		1993	2	02	02	02				
		1993	1	02	02	02				
		1992	3	34	34	34				
		1992	2	08	08	05				
		1992	1	0	0	0				
		1991	4	01	01	01				
		1991	3	02	02	02				
B405289	WLM	1994	2	0	0	0				
		1993	2	02	02	02				
		1993	1	02	02	02				
		1992	3	34	34	36	02	02	02	
		1992	2	07	07	06				
		1992	1	04	04	04				
		1991	4	01	01	01				
		1991	3	02	02	02				

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ROCKY FLATS GROUNDWATER SAMPLING HNu READINGS

Well ID	Status	Year	Qtr	Survey Results						COMMENTS
				At Opening			After Venting			
				BG	BZ	WH	BG	BZ	WH	
		1991	2	0 3	0 3	0 3				
B106089	SAMPLE	1994	2	0	0	0				
		1994	1	2 1	2 1	2 1				
		1993	4	0 3	0 3	0 3				
		1993	3	0	0	0				
		1993	2	0 3	0 3	0 3				
		1993	1	0 2	0 2	0 3				No venting data
		1992	3	0 1	0 1	0 1				
		1992	2	0 4	0 4	0 3				
B206289	SAMPLE	1994	2	0	0	0				
		1994	1	4 5	4 5	5				no venting info
		1993	4	0 2	0 2	0 2				
		1993	3	0 3	0 3	0 3				
		1993	2	0 3	0 3	0 3				
		1993	1	0 2	0 4	0				
		1992	3	0 1	0 1	0 1				
		1992	2	0 4	0 4	0 4				
B206489	SAMPLE	1994	2	0	0	0				
		1994	1	2 3	2 3	2 3				
		1993	4	0 2	0 2	0 2				
		1993	3	0 3	0 3	0 3				
		1993	2	0 4	0 4	0 4				
		1993	1	0 3	0 2	0 2				
		1992	3	0 2	0 2	0 2				
		1992	2	0 4	0 4	0 4				
B206589	SAMPLE	1994	2	0	0	0				
		1994	1	5 5	5 5	5 3				
		1993	3	0	0	0				
		1993	2	0 2	0 2	0 2				
		1993	1	0 3	0 3	0 4				
		1992	3	0 1	0 1	0 1				
		1992	2	0 4	0 4	0 4				
		1992	1	0 3	0 2	0 2				
B206689	SAMPLE	1994	2	0	0	0				
		1994	1	1 1	1 1	1 1				
		1993	4	0 2	0 2	0 2				
		1993	3	0 2	0 2	0 2				
		1993	2	0 2	0 2	0 2				
		1992	3	0 2	0 2	0 2				
		1992	2	0 5	0 5	0 5				
		1992	1	0 3	0 2	0 1				
B206789	SAMPLE	1994	2	0	0	0				
		1994	1	0 02	0 02	0 02				
		1993	4	0 2	0 2	0 2				
		1993	3	0 1	0 1	0 1				
		1993	2	0 2	0 2	0 2				
		1993	1	0 8	0 8	12				no venting info
		1992	3	0 2	0 2	0 2				
		1992	2	1 6	1 6	1 6				
B206889	SAMPLE	1994	2	0	0	0				
		1994	1	0 2	0 2	0 2				
		1993	4	0 3	0 3	0 3				
		1993	3	0 2	0 2	0 2				
		1993	1	0 5	0 5	0 5				
		1992	3	0 2	0 2	0 2				

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ROCKY FLATS GROUNDWATER SAMPLING HNu READINGS

Well ID	Status	Year	Qtr	Survey Results						COMMENTS
				At Opening			After Venting			
				BG	BZ	WH	BG	BZ	WH	
		1993	1	0 2	0 2	0 2				
		1992	3	0 3	0 3	0 3				
		1992	2	0 3	0 3	0 3				
P207889	SAMPLE	1994	2	0	0	0				
		1994	1	7 5	7 5	7 5				
		1993	4	0 2	0 2	0 2				
		1993	3	0 3	0 3	0 3				
		1993	2	0 3	0 3	0 3				
		1992	3	0 3	0 3	0 3				
		1992	2	0 3	0 3	0 3				
		1992	1	0 7	0 7	0 7				
P207989	SAMPLE	1994	2	0	0	0				
		1994	1	7 2	7 2	7 2				
		1993	4	0 6	0 6	0 6				
		1993	3	0 3	0 3	0 3				
		1993	2	0 1	0 1	0 1				
		1993	1	1	1	1				
		1992	3	0 3	0 3	0 3				
		1992	2	0 3	0 3	0 3				
B208089	SAMPLE	1994	2	0	0	0				
		1994	1	0 7	0 7	0 7				
		1993	4	0 2	0 2	0 2				
		1993	3	0 2	0 2	0 2				
		1993	2	0 6	0 6	0 6				
		1992	3	0 4	0 4	0 4				
		1992	2	0 4	0 4	0 4				
		1992	1	0 2	0 2	0 2				
B208189	SAMPLE	1994	2	0	0	0				
		1994	1	6 4	6 4	6 4				
		1993	4	0 2	0 2	0 2				
		1993	3	0 2	0 2	0 2				
		1993	2	0 6	0 6	0 6				
		1992	3	0 4	0 4	0 4				
		1992	2	0 4	0 4	0 3				
		1992	1	0 2	0 1	0 1				
B208289	SAMPLE	1994	2	0	0	0				
		1994	1	4	4	4				
		1993	4	0 2	0 2	0 2				
		1993	3	0 2	0 2	0 2				
		1993	1	0 4	0 4	0 4				
		1992	3	0 3	0 3	0 3				
		1992	2	0 4	0 4	0 4				
		1992	1	0 3	0 2	0 2				
B208389	WLM	1994	2	0	0	0				
		1993	2	0 1	0 1	0 1				
		1992	3	0 4	0 4	0 4				
		1992	2	0 4	0 4	0 4				
		1992	1	0 3	0 2	0 2				
		1991	4	0 2	0 2	0 2				
		1991	3	0 2	0 2	0 2				
B208489	WLM	1994	2	0	0	0				
		1993	2	0 2	0 2	0 2				
		1992	3	0 4	0 4	0 4				
		1992	2	0 4	0 4	0 4				
		1992	1	0 3	0 2	0 2				

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ROCKY FLATS GROUNDWATER SAMPLING HNu READINGS

Well ID	Status	Year	Qtr	Survey Results						COMMENTS
				At Opening			After Venting			
				BG	BZ	WH	BG	BZ	WH	
		1992	1	0 4	0 3	0 2				
		1991	4	0 4	0 4	0 4				
		1991	3	0 2	0 2	0 2				
P209289	SAMPLE	1994	2	0	0	0				
		1994	1	0		0				
		1993	4	0 3	0 3	0 3				
		1993	3	0 1	0 1	0 1				
		1993	2	0 6	1	200	0 4	0 4	0 4	
		1993	1	0 3	0 3	0 3				
		1992	3	0 3	0 3	0 3				
		1992	2	0 3	0 3	0 3				
P209389	SAMPLE	1994	2	0	0	0				
		1994	1	0	0	0				
		1993	4	0 5	0 5	0 5				
		1993	3	0 3	0 3	0 3				
		1993	2	0 4	0 4	0 4				
		1992	3	0 3	0 3	0 3				
		1992	2	0 3	0 3	0 3				
		1992	1	0 2	0 2	0 2				
P209489	SAMPLE	1994	2	0	0	0				
		1994	1	0	0	0				
		1993	4	0 6	0 6	0 6				
		1993	3	0 3	0 3	0 3				
		1993	2	0 3	0 3	0 3				
		1993	1	0 5	0 5	0 5				
		1992	3	0 3	0 3	0 3				
		1992	2	0 3	0 3	0 3				
P209589	SAMPLE	1994	2	0	0	0				
		1994	1	0 2	0 2	0 2				
		1993	3	0 3	0 3	0 3				
		1993	2	0 2	0 2	0 2				
		1992	3	0 3	0 3	0 3				
		1992	2	0 3	0 3	0 3				
		1992	1	0 3	0 3	0 3				
		1991	4	0 4	0 4	0 8	0 2	0 2	0 2	
P209689	SAMPLE	1994	2	0	0	0				
		1994	1	6 5	6 5	6 5				
		1993	3	0 3	0 3	0 3				
		1993	2	0 4	0 4	0 4				
		1993	1	1	1	1				
		1992	3	0 3	0 3	0 3				
		1992	2	0 3	0 3	0 3				
		1992	1	0 6	0 6	0 6				
P209789	SAMPLE	1994	2	0	0	0				
		1994	1	0	0	0				
		1993	4	0 6	0 6	0 6				
		1993	3	0 2	0 2	0 2				
		1993	2	0 4	0 4	2				No venting data
		1992	3	0 3	0 3	0 3				
		1992	2	0 3	0 3	0 3				
		1992	1	0 1	0 1	0 1				
P209889	SAMPLE	1994	2	0	0	0				
		1994	1	0	0	0				
		1993	4	0 5	0 5	0 5				
		1993	3	0 3	0 3	0 3				

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ROCKY FLATS GROUNDWATER SAMPLING HNu READINGS

Well ID	Status	Year	Qtr	Survey Results						COMMENTS
				At Opening			After Venting			
				BG	BZ	WH	BG	BZ	WH	
		1992	1	0 3	0 3	0 3				
		1991	4	0 3	0 3	0 3				
		1991	3	0 2	0 2	0 3	0 2	0 2	0 2	
		1991	2	0 3	0 4	0 4	0 4	0 4	0 4	
		1991	1	0	0	0				
B410789	SAMPLE	1994	2	0	0	0				
		1992	3	0 3	0 3	0 3				
		1992	2	0 8	0 8	0 5				
		1992	1	0 2	0 2	0 2				
		1991	4	0 3	0 3	0 3				
		1991	3	0 2	0 2	0 2				
		1991	2	0 4	0 3	0 3				
		1991	1	0 4	0 4	0 4				
B110889	SAMPLE	1994	2	0	0	0				
		1994	1	5	5	5				
		1993	3	0 2	0 2	0 2				
		1993	2	0 2	0 2	0 2				
		1993	1	0 5	0 5	0 5				
		1992	3	0 4	0 4	0 4				
		1992	2	0 8	0 8	0 5				
		1992	1	0 3	0 3	0 3				
B110989	SAMPLE	1994	2	0	0	0				
		1994	1	3 8	3 8	3 8				
		1993	4	0 4	0 4	0 4				
		1993	3	0 2	0 2	0 2				
		1993	2	0 2	0 2	0 2				
		1993	1	0 5	0 5	0 5				
		1992	3	0 8	0 8	0 8				
		1992	2	0 7	0 7	0 4				
B111189	SAMPLE	1994	2	0	0	0				
		1994	1	4 8	4 8	4 8				
		1993	3	0 1	0 1	0 1				
		1993	2	0 2	0 2	0 2				
		1993	1	0 4	0 4	0 4				
		1992	3	0 4	0 4	0 4				
		1992	2	0 6	0 6	0 4				
		1992	1	0 2	0 2	0 2				
B411289	SAMPLE	1994	2	0	0	0				
		1992	3	0 5	0 5	0 5				
		1992	2	0 8	0 8	0 8				
		1992	1	0 3	0 3	0 3				
		1991	4	0 2	0 2	0 2				
		1991	3	0 1	0 1	0 1				
		1991	2	0 3	0 3	0 3				
		1992	1	0 3	0 3	0 2				
B411389	SAMPLE	1994	2	0	0	0				
		1994	1	1 9	1 9	1 9				
		1993	4	0	0	0				
		1993	3	0 2	0 2	0 2				
		1993	4	0 4	0 4	0 4				
		1992	3	0 3	0 3	0 3				
		1992	2	0 8	0 8	0 4				
		1992	1	0 2	0 2	0 2				
P313489	SAMPLE	1994	2	0	0	0				
		1994	1	1 6	1 6	1 6				

TABLE E-2

ROCKY FLATS GROUNDWATER SAMPLING HNu READINGS

Well ID	Status	Year	Qtr	Survey Results						COMMENTS
				At Opening			After Venting			
				BG	BZ	WH	BG	BZ	WH	
		1994	1	0 8	0 8	0 8				
		1993	4	0 2	0 2	0 2				
		1992	3	0 2	0 2	0 2				
		1992	2	0 3	0 3	0 3				
P114689	SAMPLE	1994	2	0	0	0				
		1994	1	2	2	2				
		1993	4	0 9	0 9	0 9				
		1993	2	0 6	0 6	0 6				
		1992	3	0 4	0 4	0 4				
		1992	2	0 5	0 5	0 5				
P114789	SAMPLE	1994	2	0	0	0				
		1994	1	0 35	0 35	0 35				
		1993	4	0 6	0 6	0 6				
		1992	3	0 4	0 4	0 4				
		1992	2	0 4	0 4	0 4				
P114889	SAMPLE	1994	2	0	0	0				
		1994	1	1 6	1 6	1 6				
		1993	4	0 6	0 6	0 6				
		1992	3	0 3	0 3	0 3				
		1992	2	0 4	0 4	0 4				
P114989	SAMPLE	1994	2	0	0	0				
		1994	1	1 8	1 8	1 8				
		1993	4	0 2	0 2	0 2				
		1992	3	0 3	0 3	0 3				
		1992	2	0 3	0 3	0 3				
P115089	SAMPLE	1994	2	0	0	0				
		1994	1	1 9	1 9	1 9				
		1993	4	0 2	0 2	0 2				
		1992	3	0 4	0 4	0 4				
		1992	2	0 3	0 3	0 3				
B315289	WLM	1994	2	0	0	0 1				No venting data
P115489	SAMPLE	1994	2	0	0	0				
		1994	1	2 5	2 5	2 5				
		1993	4	2 3	2 3	2 3				
		1992	3	0 3	0 3	0 3				
		1992	2	0 4	0 4	0 4				
P115589	SAMPLE	1994	2	0	0	2 1	0	0	0	
		1994	1	3	3	3				
		1993	4	0 8	0 8	0 8				
		1992	3	0 3	0 3	0 3				
		1992	2	0 4	0 4	0 5				No venting data
P115689	SAMPLE	1994	2	0	0	0				
		1994	1	2	2	4 9	0 7	0 7	0 7	
		1993	4	0 6	0 6	0 6				
		1992	3	0 4	0 4	0 4				
		1992	2	0 5	0 5	0 5				
P215789	SAMPLE	1994	2	0	0	0				
		1994	1	1 4	1 4	1 4				
		1993	4	0 9	0 9	0 9				
		1992	3	0 4	0 4	0 4				
		1992	2	0 5	0 5	0 5				
P415889	SAMPLE	1994	2	0	0	0				
		1994	1	1	1	1				
		1993	4	0 2	0 2	0 2				
		1992	3	0 3	0 3	0 3				

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ROCKY FLATS GROUNDWATER SAMPLING HNu READINGS

Well ID	Status	Year	Qtr	Survey Results						COMMENTS
				At Opening			After Venting			
				BG	BZ	WH	BG	BZ	WH	
		1992	2	0 4	0 4	0 4				
P416989	SAMPLE	1994	2	0	0	0				
		1994	1	0 2	0 2	0 2				
		1993	4	0 2	0 2	0 2				
B317189	WLM	1994	2	0	0	0				
		1994	1	6 1	6 1	6 1				
		1992	3	0 1	0 1	0 1				
		1992	2	0 4	0 4	0 4				
		1992	1	0	0	0				
B217289	SAMPLE	1994	2	0	0	0				
		1994	1	0 2	0 2	0 2				
		1993	4	3	3	3				
		1993	3	0 4	0 4	0 4				
		1992	3	0 2	0 2	0 2				
		1992	2	0 8	0 8	0 8				
		1992	1	0 4	0 4	0 4				
B217489	WLM	1994	2	0	0	0				
		1994	1	8 2	8 2	8 2				
		1993	2	0 1	0 1	0 1				
		1993	1	0 5	0 5	0 5				
B217589	WLM	1994	2	0	0	0				
		1993	3	0 1	0 1	0 1				
B217689	WLM	1994	2	0	0	0				
		1993	2	0 1	0 1	0 1				
		1993	1	0 4	0 4	0 4				
B217789	WLM	1994	2	0	0	0				
		1994	1	2	2	2				
		1993	1	0 4	0 4	0 4				
P317989	WLM	1994	2	0	0	0				
		1992	3	0 4	0 4	0 4				
		1992	2	0 2	0 2	0 2				
		1992	1	0 2	0 2	0 2				
		1991	4	0 2	0 2	0 2				
		1991	3	0 2	0 2	0 2				
		1991	2	0 6	0 6	0 6				
		1991	1	0 4	0 3	0 3				
P218089	WLM	1994	2	0	0	0				
		1994	1	0	0	0				
		1993	3	0 6	0 6	0 6				
		1993	1	0 3	0 3	0 3				
		1992	3	0 3	0 3	0 3				
		1992	2	0 3	0 3	0 3				
		1992	1	0 3	0 2	0 2				
		1991	4	0 2	0 2	0 2				
P218289	SAMPLE	1994	2	0	0	0				
		1994	1	3 5	3 5	3 5				
		1993	4	0 2	0 2	0 2				
P218389	SAMPLE	1994	2	0	0	0				
		1994	1	0	0	0				
		1993	4	0 4	0 4	0 4				
		1992	3	0 3	0 3	0 3				
		1992	2	0 3	0 3	0 3				
B218789	WLM	1994	2	0	0	0				
		1992	3	0 1	0 1	0 1				
		1992	2	0 3	0 3	0 3				

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ROCKY FLATS GROUNDWATER SAMPLING HNu READINGS

Well ID	Status	Year	Qtr	Survey Results						COMMENTS
				At Opening			After Venting			
				BG	BZ	WH	BG	BZ	WH	
0590	WLM	1994	2	0	0	0				
		1993	2	0 3	0 3	0 3				
		1992	3	0 3	0 3	0 3				
		1992	2	5 2	5 2	5 8				
0690	WLM	1994	2	0	0	0				
		1993	2	0 3	0 3	0 3				
		1992	2	0 4	0 4	0 4				
0790	WLM	1994	2	0	0	0				
		1993	2	0 3	0 3	0 3				
0990	WLM	1994	2	0	0	0				
		1993	2	0 3	0 3	0 3				
		1992	2	0 4	0 4	0 4				
1490	SAMPLE	1994	2	0	0	0				
		1994	1	0 02	0 02	0 02				
		1993	4	1	1	1				
		1993	3	0 2	0 2	0 2				
		1993	2	0 1	0 1	0 1				
		1993	1	0 3	0 3	0 3				
00191	SAMPLE	1994	2	0	0	0				
		1994	1	1 2	1 2	1 2				
		1993	4	0 2	0 2	0 2				
		1993	3	0	0 02	0 02				No venting data
		1993	2	0 4	0 4	0 4				
		1993	1	0 5	0 5	1				
		1992	3	0 3	0 3	0 3				
		1992	2	0 4	0 4	0 4				
00291	SAMPLE	1994	2	0	0	0				
		1994	1	0 2	0 2	0 2				
		1993	4	0 2	0 2	0 2				
		1993	3	0 3	0 3	0 3				
		1993	2	0 3	0 3	0 3				
		1993	1	0 2	0 2	0 2				
		1992	3	0 4	0 4	0 4				
		1992	2	0 4	0 4	0 4				
00391	SAMPLE	1994	2	0	0	0				
		1994	1	0 2	0 2	0 2				
		1993	3	0 1	0 1	0 1				
		1993	2	0 2	0 2	0 2				
		1993	1	0 4	0 4	1				No venting data
		1993	4	0 2	0 2	0 2				
		1992	3	0 3	0 3	0 3				
		1992	2	0 2	0 2	0 4				No venting data
00491	SAMPLE	1994	2	0	0	0				
		1994	1	0 2	0 2	0 2				
		1993	4	4	4	4				
		1993	3	0 2	0 2	0 2				
		1993	2	0 2	0 2	0 2				
		1993	1	0 8	0 8	0 8				
		1992	3	0 6	0 6	0 6				
		1992	2	0 4	0 4	0 4				
00691	SAMPLE	1994	2	0	0	0				
		1994	1	6	6	6				
		1993	4	0 2	0 2	0 2				
		1992	3	0 6	0 6	0 6				
		1992	2	4 8	4 8	5 4				No venting data

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ROCKY FLATS GROUNDWATER SAMPLING HNu READINGS

Well ID	Status	Year	Qtr	Survey Results						COMMENTS
				At Opening			After Venting			
				BG	BZ	WH	BG	BZ	WH	
		1992	2	48	48	5				No venting data
		1992	3	01	01	01				
02091	SAMPLE	1994	2	0	0	0				
		1994	1	42	42	84				No venting data
		1993	4	26	26	92				No venting data
		1993	3	02	02	25				Rapid dissipation
		1993	1	04	04	04				
		1992	3	02	02	02				
		1992	3	02	02	02				
		1992	1	16	16	24				No venting data
02191	WLM	1994	2	0	0	0				
		1992	3	04	04	04				
		1992	2	02	02	65				No venting data
		1992	1	15	18	5				No venting data
		1991	4	41	41	41				
02291	SAMPLE	1994	2	0	0	0				
		1994	1	02	02	04				No venting data
		1993	4	02	02	22	02	02	20	
		1993	3	02	02	02				
		1993	1	05	05	2	05	05	05	1 min. venting
		1992	3	03	03	03				
		1992	2	05	05	2	1	1	1	
		1992	1	2	2	2				
02391	WLM	1994	2	0	0	0				
		1992	3	04	04	04				
		1992	2	02	02	02				
		1992	1	03	03	03				
02491	SAMPLE	1994	2	0	0	0				
		1994	1	02	02	02				
		1993	4	22	22	22				
		1993	3	02	02	02				
		1992	3	04	04	04				
		1992	2	05	05	05				
		1992	1	15	15	14	82	82	82	
		1991	4	42	44	52				
02591	SAMPLE	1994	2	0	0	0				
		1994	1	35	35	35				
		1993	4	2	2	2				
		1993	3	01	01	01				
		1993	2	04	04	04				
		1993	1	07	07	07				
		1992	3	01	01	01				
		1992	2	48	48	66	04	04	04	
02691	SAMPLE	1994	2	0	0	0				
		1994	1	02	02	02				
		1993	4	09	09	09				
		1993	3	03	03	03				
		1993	2	02	02	02				
		1993	1	08	08	08				
		1992	3	03	03	03				
		1992	2	04	05	15	05	05	05	
02791	WLM	1994	2	0	0	0				
		1992	3	01	01	01				
		1992	2	02	02	02				
		1992	1	28	28	6				No venting data

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ROCKY FLATS GROUNDWATER SAMPLING HNu READINGS

Well ID	Status	Year	Qtr	Survey Results						COMMENTS
				At Opening			After Venting			
				BG	BZ	WH	BG	BZ	WH	
03791	SAMPLE	1994	2	0	0	0				
		1994	1	3 3	3 3	3 3				
		1993	3	0 3	0 3	0 3				
		1993	2	0 4	0 4	0 4				
		1993	1	0 7	0 7	0 7				
		1992	3	0 2	0 2	0 2				
		1992	2	0 2	0 2	0 2				
		1992	1	6	6	6				
03891	WLM	1994	2	0	0	0				
		1992	3	0 1	0 1	0 1				
		1992	2	0 2	0 2	0 2				
		1992	1	2	2	2				
		1991	4	1 2	1 2	1 2				
03991	SAMPLE	1994	2	0	0	0				
		1994	1	2 9	2 9	2 9				
		1993	3	0 2	0 2	0 2				
		1993	4	0 6	0 6	0 6				
		1993	2	0 2	0 2	0 2				
		1993	1	0 6	0 6	0 6				
		1992	3	0 1	0 1	0 1				
		1992	2	3 3	3 3	3 3				
04091	SAMPLE	1994	2	0	0	0				
		1994	1	2 8	2 8	2 8				
		1993	4	0 2	0 2	0 2				
		1993	3	0 2	0 2	0 2				
		1993	2	0 4	0 4	0 4				
		1993	1	0 6	0 6	0 6				
		1992	3	0 6	0 6	0 6				
		1992	2	4	4	5	4 8	5	5 4	Day 2
04191	SAMPLE	1994	2	0	0	0				
		1994	1	0 8	0 8	0 8				
		1993	4	1 1	1 1	1 1				
		1993	2	0 3	0 3	0 3				
		1993	1	0 2	0 2	0 2				
		1992	3	0 2	0 2	0 2				
		1992	2	0 4	0 4	0 4				
		1992	1	2	2	2				
04291	SAMPLE	1994	2	0	0	0				
		1994	1	0 8	0 8	0 8				
		1993	4	0 3	0 3	0 3				
		1993	2	0 2	0 2	0 2				
		1992	3	0 3	0 3	0 4	0 4	0 4	0 4	
		1992	2	0 4	0 4	0 4				
		1992	1	4 8	4 8	6 2				No venting data
04491	SAMPLE	1994	2	0	0	0				
		1994	1	0 8	0 8	0 8				
		1993	4	0 2	0 2	0 2				
		1993	2	0 03	0 03	0 03				
		1992	3	0 9	0 9	0 4				
		1992	2	0 4	0 4	0 6	0 2	0 2	0 2	
		1992	1	7 8	7 8	8				No venting data
04591	SAMPLE	1994	2	0	0	0				
		1994	1	0 2	0 2	0 2				
		1993	4	0 2	0 2	0 2				
		1993	3	0 2	0 2	0 2				

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ROCKY FLATS GROUNDWATER SAMPLING HNu READINGS

Well ID	Status	Year	Qtr	Survey Results						COMMENTS
				At Opening			After Venting			
				BG	BZ	WH	BG	BZ	WH	
		1993	4	0 3	0 3	0 3				
		1993	3	0 3	0 3	0 4				No venting data
		1993	2	0 2	0 2	0 2				
		1993	1	0 6	0 6	0 8				No venting data
		1992	3	0 2	0 2	0 2				
		1992	2	0 3	0 3	0 3				
05991	WLM	1994	2	0	0	0				
06091	SAMPLE	1994	2	0	0	0				
		1994	1	2 8	2 8	2 8				
		1993	4	0 2	0 2	0 2				
		1993	3	0 1	0 1	0 1				
		1993	2	0 4	0 4	0 4				
		1993	1	0 6	0 6	0 6				
		1992	3	0 2	0 2	0 2				
		1992	2	0 4	0 4	0 4				
		1992	1	1 8	1 8	1 8				
06191	SAMPLE	1994	2	0	0	0 6				No venting data
		1994	1	0 3	0 3	0 3				
		1993	4	2	2	2				
		1993	3	0 1	0 1	0 1				
		1993	2	0 8	0 8	0 8				
		1993	1	0 7	0 7	0 7				
		1992	3	0 1	0 1	0 1				
		1992	2	0 3	0 3	0 3				
06291	SAMPLE	1994	2	0	0	0				
		1994	1	0 2	0 2	0 2				
		1993	4	0 6	0 6	0 6				
		1993	3	0 1	0 1	0 1				
		1993	2	0 4	0 4	0 4				
		1992	3	1 1	1 1	1 1				
		1992	2	0 5	0 5	0 5				
		1992	1	1 6	1 6	1 6				
06391	WLM	1994	2	0	0	0				
		1994	1	0 5	0 5	0 5				
		1993	4	0 4	0 4	0 4				
		1993	1	0 6	0 6	0 6				
		1992	3	1	1	1				
		1992	2	0 4	0 4	0 4				
		1992	1	1 6	1 6	1 6				
		1991	4	0 6	0 6	0 6				
06491	SAMPLE	1994	2	0	0	0				
		1994	1	0	0	0				
		1993	4	0 2	0 2	0 2				
		1993	3	0 3	0 3	0 3				
		1993	2	0 2	0 2	0 2				
		1993	1	0 4	0 4	0 6	0 3	0 3	0 3	
		1992	3	0 2	0 2	0 2				
		1992	2	11 4	11 4	17 2	0 4	0 4	0 4	
06591	SAMPLE	1994	2	0	0	0				
		1994	1	1	1	1				
		1993	4	0 4	0 4	0 4				
		1993	3	0 4	0 4	0 4				
		1993	2	0 2	0 2	0 2				
		1993	1	0 3	0 3	0 3				
		1992	3	0 4	0 4	0 3				

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ROCKY FLATS GROUNDWATER SAMPLING HNu READINGS

Well ID	Status	Year	Qtr	Survey Results						COMMENTS
				At Opening			After Venting			
				BG	BZ	WH	BG	BZ	WH	
		1992	2	4	4	35	0 3	0 3	0 4	Next month
07891	SAMPLE	1994	2	0	0	0				
		1994	1	0 2	0 2	0 2				
		1993	4	0 2	0 2	0 2				
		1993	3	0 3	0 3	0 3				
		1993	1	0 5	0 5	0 5				
		1992	3	0 1	0 1	0 1				
		1992	2	0 2	0 2	1 6	0 5	0 5	0 5	
07991	SAMPLE	1994	2	0	0	0				
		1994	1	0 2	0 2	0 2				
		1993	4	0 4	0 4	0 4				
		1993	3	0 3	0 3	0 3				
		1993	2	0 2	0 2	0 2				
		1993	1	0 2	0 2	0 2				
		1992	3	0 4	0 4	0 4				
		1992	2	0 4	0 4	1 8				No venting data
08091	SAMPLE	1994	2	0	0	0				
		1994	1	0 8	0 8	0 8				
		1993	4	0 3	0 3	0 3				
		1993	3	1 4	1 4	1 4				
		1993	1	1 4	1 4	1 4				
		1992	3	0 3	0 3	0 3				
		1992	2	0 4	0 4	0 6	0 6	0 6	0 6	Next month
		1992	1	5 5	5 5	6 4				No venting data
08291	WLM	1994	2	0	0	0				
		1992	3	0 4	0 5	0 4	0 3	0 3	0 3	
		1992	2	0 4	0 4	0 6	0 2	0 2	0 2	Next month
		1992	1	2 2	2 2	2 2				
08391	WLM	1994	2	0	0	0				
		1993	2	0 03	0 03	0 003				
		1993	1	0 8	0 8	0 8				
		1993	3	0 3	0 3	0 3				
		1992	3	0 7	0 7	0 6				
		1992	2	0 4	0 4	0 4				
		1992	1	2	2	2				
08491	WLM	1994	2	0	0	0				
		1992	3	0 3	0 3	0 3				
		1992	2	0 4	0 4	1	0 2	0 2	0 2	Next month
		1992	1	3 8	4 2	5 2				
08591	WLM	1994	2	0	0	0				
		1993	2	0 2	0 2	0 2				
		1993	1	1 4	1 4	1 4				
		1992	3	0 2	0 2	0 2				
		1992	2	0 2	0 4	0 6	0 4	0 4	0 4	
		1992	1	2	2	3				
08891	SAMPLE	1994	2	0	0	0				
		1994	1	1	3	4				Vented quickly
		1993	4	0 4	0 4	30				No venting data
		1993	3	0 3	0 3	50	0 2	0 2	50	Day 2
		1993	2	0 2	0 2	0 2				
		1993	1	0 5	0 5	12	0 4	0 4	12	Day 2
		1992	3	0 4	0 4	43				No venting data
		1992	2	0 6	0 6	0 8				No venting data
09091	SAMPLE	1994	2	0	0	0				
		1994	1	1	1	1				

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ROCKY FLATS GROUNDWATER SAMPLING HNu READINGS

Well ID	Status	Year	Qtr	Survey Results						COMMENTS
				At Opening			After Venting			
				BG	BZ	WH	BG	BZ	WH	
		1994	1	0 2	0 2	0 2				
		1993	4	0 6	0 6	0 6				
		1993	3	0 2	0 2	0 2				
		1993	1	0 6	0 6	0 6				
		1992	3	0 4	0 4	0 4				
		1992	2	0 5	0 5	1 5	0 3	0 3	0 3	Next month
12191	SAMPLE	1994	2	0	0	0				
		1994	1	1 2	1 2	1 2				
		1993	4	2 1	5 2	2 1				No venting data
		1993	3	0 2	0 2	0 2				
		1993	2	0 3	7	0 3	0 8	0 8	2	
		1993	1	0 2	0 2	0 2				
		1992	3	0 1	0 1	0 1				
		1992	2	0 2	0 2	0 2				
12291	SAMPLE	1994	2	0	0	0				
		1994	1	0 7	0 7	0 7				
		1993	4	0 2	0 2	0 2				
		1993	3	0 2	0 2	0 2				
		1993	2	0 2	0 2	0 2				
		1993	1	0 4	0 4	0 4				
		1992	3	0 5	0 5	0 5				
		1992	2	0 8	0 8	0 6				
12391	SAMPLE	1994	2	0	0	0				
		1994	1	0	0	0				
		1993	4	0 2	0 2	0 2				
		1993	3	0 1	0 1	0 1				
		1993	2	0 2	0 2	0 2				
		1993	1	0 6	0 6	0 6				
		1992	3	0 9	0 9	0 9				
		1992	2	0 3	0 3	0 3				
12491	SAMPLE	1994	2	0	0	0				
		1994	1	0 8	0 8	0 8				
		1993	4	3	3	3				
		1993	3	0	0	0				
		1993	2	0 2	0 2	0 2				
		1993	1	0 5	0 5	0 5				
		1992	3	0 3	0 3	0 3				
		1992	2	0.3	0 3	0 3				
12691	SAMPLE	1994	2	0	0	0				
		1994	1	2 5	2 5	2 5				
		1993	4	0 4	0 4	0 4				
		1993	3	0 3	0 3	0 3				
		1993	2	0 3	0 3	0 3				
		1993	1	0 6	0 6	0 6				
		1992	3	0 1	0 1	0 1				
		1992	2	0 4	0 4	0 4				
12891	WLM	1994	2	0	0	0				
		1992	3	0 3	0 3	0 4	0 2	0 2	0 2	
		1992	2	0 4	0 4	1	0 4	0 4	0 4	
12991	SAMPLE	1994	2	0	0	0				
		1994	1	0 2	0 2	0 2				
		1993	4	0 2	0 2	0 2				
		1993	3	0 3	0 3	0 3				
		1993	2	0 3	0 3	0 3				
		1993	1	0 6	0 6	0 6				

TABLE E-2

ROCKY FLATS GROUNDWATER SAMPLING HNu READINGS

Well ID	Status	Year	Qtr	Survey Results						COMMENTS
				At Opening			After Venting			
				BG	BZ	WH	BG	BZ	WH	
		1994	1	0 2	0 2	0 2				
		1993	4	0 2	0 2	0 2				
		1993	3	0 3	0 3	0 3				
		1993	1	0 2	0 2	0 2				
		1992	3	0 3	0 3	0 3				
		1992	2	0 3	0 3	0 3				
31791	SAMPLE	1994	2	0	0	0				
		1994	1	1 8	1 8	1 8				
		1993	3	0 2	0 2	0 2				
		1993	2	0 2	0 2	0 2				
		1993	1	0 2	0 2	0 2				
		1992	3	0 3	0 3	0 3				
		1992	2	0 4	0 4	0 4				
31891	SAMPLE	1994	2	0	0	0				
		1994	1	1 7	1 7	1 7				
		1993	4	0 2	0 2	0 2				
		1993	3	0 3	0 3	0 3				
		1993	1	0 7	0 7	0 7				
		1992	3	0 4	0 4	0 4				
		1992	2	0 4	0 4	0 4				
32591	SAMPLE	1994	2	0	0	0				
		1994	1	0 2	0 2	0 2				
		1993	4	0 3	0 3	0 3				
		1993	3	0 2	0 2	0 2				
		1993	1	0 6	0 6	0 6				
		1992	3	0 3	0 3	0 3				
		1992	2	0 2	0 2	0 2				
33491	SAMPLE	1994	2	0	0	0				
7		1994	1	1	1	1				
		1993	4	0	0	0				
		1993	3	0 3	0 3	0 3				
		1993	1	0 6	0 6	0 6				
		1992	3	0 4	0 4	0 4				
		1992	2	4 5	4 5	6	0 4	0 4	0 4	
33691	WLM	1994	2	0	0	0				
		1993	2	0 2	0 2	0 2				
		1992	3	0 4	0 4	0 4				
		1992	2	0 4	0 4	0 4				
33891	SAMPLE	1994	2	0	0	0				
		1994	1	0	0	0				
		1993	4	0 2	0 2	0 2				
		1993	3	0 4	0 4	0 4				
		1993	2	0 6	0 6	0 6				
		1993	1	0 6	0 6	0 6				
		1992	3	0 3	0 3	0 3				
		1992	2	0 9	0 9	0 9				
34591	WLM	1994	2	0	0	0				
		1992	3	0 5	0 5	0 5				
		1992	2	4	4	4				
34791	SAMPLE	1994	2	0	0	0				
		1994	1	3 2	3 2	3 2				
		1993	4	0	0	0				
		1993	3	0 4	0 4	0 4				
		1993	2	0 3	0 3	0 3				
		1993	1	0 3	0 3	0 3				

TABLE E-2

ROCKY FLATS GROUNDWATER SAMPLING HNu READINGS

Well ID	Status	Year	Qtr	Survey Results						COMMENTS
				At Opening			After Venting			
				BG	BZ	WH	BG	BZ	WH	
37691	SAMPLE	1994	2	0	0	0				
		1994	1	1	1	1				
		1993	4	0 2	0 2	0 2				
		1993	3	0 2	0 2	0 2				
		1993	2	0 2	0 2	0 2				
		1992	3	0 4	0 4	0 4				
		1992	2	5 4	5 4	5 4				
37791	SAMPLE	1994	2	0	0	0				
		1994	1	3 5	3 5	3 5				
		1993	4	0 2	0 2	0 2				
		1993	3	0 3	0 3	0 3				
		1993	1	0 3	0 3	0 3				
		1992	3	0 4	0 4	0 4				
		1992	2	0 3	0 3	0 3				
37891	SAMPLE	1994	2	0	0	0				
		1994	1	1	1	1				
		1993	3	1	1	1				
		1993	2	0 2	0 2	0 2				
		1993	1	0 8	0 8	0 8				
		1992	3	0 4	0 4	0 4				
		1992	2	4 5	4 5	1 9				
37991	SAMPLE	1994	2	0	0	0				
		1994	1	1	1	1				
		1993	4	0 9	0 9	0 9				
		1993	3	0 2	0 2	0 2				
		1993	2	0 2	0 2	0 2				
		1993	1	0 4	0 4	0 4				
		1992	3	0 4	0 4	0 4				
		1992	2	0 4	0 4	0 4				
38191	SAMPLE	1994	2	0	0	0				
		1992	3	0 3	0 3	0 3				
		1992	2	4 5	4 5	1 9				
38291	SAMPLE	1994	2	0	0	0				
		1992	3	0 4	0 4	0 9	0 3	0 3	0 3	
		1992	2	4 5	4 5	9	0 4	0 4	3	
38591	SAMPLE	1994	2	0	0	0				
		1994	1	1 9	1 9	1 9				
		1993	4	0	0	0				
		1993	3	0 4	0 4	0 4				
		1993	1	0 9	0 8	0 8				
		1992	3	0 3	0 3	0 3				
		1992	2	0 4	0 4	0 4				
38891	SAMPLE	1994	2	0	0	0				
		1994	1	2 8	2 8	2 8				
		1992	3	0 6	0 6	0 6				
		1992	2	0 2	0 2	0 2				
38991	SAMPLE	1994	2	0	0	0				
		1994	1	2 8	2 8	2 8				
		1993	2	0 1	0 1	0 1				
		1992	3	0 6	0 6	0 6				
		1992	2	4 5	4 5	5 5	0 2	0 2	0 2	
39191	SAMPLE	1994	2	0	0	0				
		1994	1	0 2	0 2	0 2				
		1993	4	0 3	0 3	0 3				
		1993	3	0 2	0 2	0 2				

TABLE E-2

ROCKY FLATS GROUNDWATER SAMPLING HNu READINGS

Well ID	Status	Year	Qtr	Survey Results						COMMENTS
				At Opening			After Venting			
				BG	BZ	WH	BG	BZ	WH	
45391	SAMPLE	1994	2	0	0	0				
		1994	1	0	0	0				
		1993	4	0 2	0 2	0 2				
		1993	3	0 3	0 3	0 3				
		1993	2	0 2	0 2	0 2				
		1993	1	0 2	0 2	0 2				
03092	ND	1994	2	0	0	0				
03192	ND	1994	2	0	0	0				
10092	SAMPLE	1994	2	0	0	0				
		1994	1	0 2	0 2	0 2				
		1993	4	0 2	0 2	0 2				
		1992	3	0 6	0 6	0 6				
10192	SAMPLE	1994	2	0	0	0				
		1994	1	0 2	0 2	0 2				
		1993	4	0 2	0 2	0 2				
		1992	3	0 6	0 6	0 6				
10292	SAMPLE	1994	2	0	0	0				
		1994	1	0 2	0 2	0 2				
		1993	4	0 2	0 2	0 2				
		1992	3	0 6	0 6	0 6				
10392	SAMPLE	1994	2	0	0	0				
		1994	1	0 2	0 2	0 2				
		1993	4	0 2	0 2	0 2				
		1992	3	0 6	0 6	0 8	0 4	0 4	0 4	
10492	SAMPLE	1994	2	0	0	0				
		1994	1	0	0	0				
		1993	4	0 3	0 3	0 3				
		1993	3	0 2	0 2	0 2				
		1993	2	0 2	0 2	0 2				
		1993	1	0 3	0 3	0 3				
		1992	3	0 6	0 6	0 6				
10592	SAMPLE	1994	2	0	0	0				
		1994	1	0	0	0				
		1993	4	0 6	0 6	0 6				
		1993	3	0 2	0 2	0 2				
		1993	2	0 2	0 2	0 2				
		1993	1	0 3	0.3	0 3				
		1992	3	0 6	0 6	0 8	0 4	0 4	0 4	
10692	SAMPLE	1994	2	0	0	0				
		1994	1	0	0	0				
		1993	4	0 6	0 6	0 6				
		1993	3	0 2	0 2	0 2				
		1993	2	0 1	0 1	0 1				
		1993	1	0 3	0 3	0 3				
		1992	3	0 4	0 6	0 6	0 4	0 4	0 4	
10792	SAMPLE	1994	2	0	0	0				
		1994	1	1	1	1				
		1993	4	0 2	0 2	0 2				
		1993	3	0 3	0 3	0 3				
		1993	2	0 1	0 1	0 1				
		1993	1	0 3	0 3	0 3				
		1992	3	0 2	0 2	0 4	0 4	0 4	0 4	
10892	SAMPLE	1994	2	0	0	0				
		1994	1	0 2	0 2	0 2				
		1993	4	0 2	0 2	0 2				

TABLE E-2

ROCKY FLATS GROUNDWATER SAMPLING HNu READINGS

Well ID	Status	Year	Qtr	Survey Results						COMMENTS
				At Opening			After Venting			
				BG	BZ	WH	BG	BZ	WH	
		1992	3	1 2	1 2	1 2				
46792	SAMPLE	1994	2	0	0	0				
		1994	1	0 2	0 2	0 2				
		1993	4	1	1	1				
		1993	2	0 4	0 4	0 4				
		1992	3	1 2	1 2	1 2				
46892	SAMPLE	1994	2	0	0	0				
		1994	1	0 2	0 2	0 2				
		1993	4	3 5	3 5	3 5				
		1993	2	0 4	0 4	0 4				
		1992	3	2 8	2 8	2 8				
		1992	2	2	2	2				
49192	SAMPLE	1994	2							
		1994	1	0 7	0 7	0 7				
		1993	4	2 5	2 5	2 5				
		1993	3	0 2	0 2	0 2				
		1993	2	0 3	0 3	0 3				
49292	SAMPLE	1994	1	0 7	0 7	0 7				
		1993	4	0	0	0				
		1993	3	0 2	0 2	0 2				
		1993	2	0 3	0 3	0 3				
50092	SAMPLE	1994	2	0	0	0				
		1994	1	0 3	0 3	0 3				
		1993	4	0 1	0 1	0 1				
		1993	3	0 1	0 1	0 1				
50192	ND	1994	2	0	0	0				
		1993	2	0 3	0 3	0 3				
50292	ND	1994	2	0	0	0				
		1993	2	0 3	0 3	0 3				
75092	SAMPLE	1994	2	0	0	0				
		1994	1	5	5	5				
		1993	4	0 1	0 1	0 1				
		1993	3	0 2	0 2	0 2				
		1993	2	0 2	0 2	0 2				
75292	SAMPLE	1994	2	0	0	0				
		1994	1	2 5	2 5	2 5				
		1993	4	0 4	0 4	0 4				
		1993	3	0 2	0 2	0 2				
		1993	2	0 4	0 4	0 4				
75892	ND	1994	2	0	0	0				
75992	SAMPLE	1994	2	0	0	0				
		1994	1	0 2	0 2	0 2				
		1993	3	0 3	0 3	0 3				
		1993	2	0 2	0 2	0 2				
76192	ND	1994	2	0	0	0				
76292	SAMPLE	1994	2	0	0	0				
		1994	1	4 3	4 3	4 3				
		1993	4	1	1	1				
		1993	3	0 3	0 3	0 3				
		1993	2	0 2	0 2	0 2				
		1993	1	0 4	0 4	0 4				
76792	ND	1994	2	0	0	0				
76992	ND	1994	2	0	0	0				
77192	ND	1994	2	0	0	0				
77392	ND	1994	2	0	0	0				

TABLE E-2

ROCKY FLATS GROUNDWATER SAMPLING HNu READINGS

Well ID	Status	Year	Qtr	Survey Results						COMMENTS
				At Opening			After Venting			
				BG	BZ	WH	BG	BZ	WH	
42993	WLM	1994	2	0	0	0				
43293	WLM	1994	2	0	0	0				
43593	WLM	1994	2	0	0	0				
43893	WLM	1994	2	0	0	0				
43993	WLM	1994	2	0	0	0				
44893	WLM	1994	2	0	0	0				
44993	WLM	1994	2	0	0	0				
45093	WLM	1994	2	0	0	0				
		1994	1	11	11	11				
45293	WLM	1994	2	0	0	0				
45393	WLM	1994	2	0	0	0				
		1994	1	4 8	4 8	4 8				
45593	WLM	1994	2	0	0	0				
45693	WLM	1994	2	0	0	0				
45793	WLM	1994	2	0	0	0				
45893	WLM	1994	2	0	0	0				
45993	WLM	1994	2	0	0	0				
46093	WLM	1994	2	0	0	0				
		1994	1	0 6	0 6	0 6				
46193	WLM	1994	2	0	0	0				
46293	WLM	1994	2	0	0	0				
46393	WLM	1994	2	0	0	2 1	0	0	0	
46493	WLM	1994	2	0	0	0				
		1994	1	11	11	11				
51193	SAMPLE	1994	2	0	0	0				
		1993	3	0 2	0 2	0 2				
		1993	2	0 2	0 2	0 2				
		1992	1	0 4	0 4	0 4				
		1994	2	4 2	4 2	4 2				
58793	SAMPLE	1994	2	0	0	0				
		1994	1	2	2	2				
		1993	3	0 2	0 2	0 2				
		1993	2	0 2	0 2	0 2				
59093	ND	1994	2	0	0	0				
		1993	2	0 2	0 2	0 2				
59393	SAMPLE	1994	2	0	0	0				
		1994	1	0	0	0				
59493	SAMPLE	1994	2							
		1994	1	1	1	1				
		1993	3	0 1	0 1	0 1				
		1993	2	0 1	0 1	0 1				
59593	SAMPLE	1994	2	0	0	0				
		1994	1	1	1	1				
		1993	3	0 2	0 2	8	0 1	0 1	0 1	Dissipated rapidly
		1993	2	0 2	0 2	500				Vented before purging
		1994	1	1	1	1				
		1993	3	0 1	0 1	0 1				
59793	ND	1994	2	0	0	0				
		1993	2	0 2	0 2	0 2				
61293	ND	1994	2	0	0	0				
		1993	2	0 2	0 2	0 2				
63093	SAMPLE	1994	2	0	0	0				
		1994	1	0	0	0				
		1993	2	0 2	0 2	0 2				
70093	SAMPLE	1994	2	0	0	0				

TABLE E-2

ROCKY FLATS GROUNDWATER SAMPLING HNu READINGS

Well ID	Status	Year	Qtr	Survey Results						COMMENTS
				At Opening			After Venting			
				BG	BZ	WH	BG	BZ	WH	
		1993	3	0 2	0 2	4				No venting data
		1993	2	0 6	0 6	0 8				
72293	SAMPLE	1994	2	0	0	0				
		1994	1	2 4	2 4	6	0	0	0	
		1993	3	0 2	0 2	1 2				
		1993	2	0 2	0 2	1 8				
72393	SAMPLE	1994	2	0	0	0				
		1994	1	1 2	1 2	1 2				
		1993	4	5 8	5 8	5 8				
		1993	2	0 6	0 6	0 6				
72493	ND	1994	2	0	0	0				
		1994	1	0 08	0 09	0 08				No venting data
		1993	4	0 3	0 3	0 3				
		1993	2	0 2	0 2	0 2				

TABLE E-3
ROCKY FLATS GROUNDWATER WELLS WITH POSITIVE PID READINGS

Well ID	Status	Year	Qtr	At Opening					After Venting					COMMENTS
				BG	BZ	WH	BZ Diff	WH Diff	BG	BZ	WH	BZ Diff	WH Diff	
0586	SAMPLE	1994	2	0	0	0	0	0				0	0	
		1994	1	0 6	0 6	0 6	0	0				0	0	
		1993	4	1 2	1 2	3	0	1 8	0 2	0 2	0 2	0	0	
		1993	3	0 3	0 3	0 3	0	0				0	0	
		1993	1	0 6	0 6	0 6	0	0				0	0	
		1993	2	0 4	0 4	0 4	0	0				0	0	
		1992	3	0 4	0 4	0 4	0	0				0	0	
		1992	2	0 3	0 3	0 3	0	0				0	0	
0786	SAMPLE	1994	2	0	0	0	0	0				0	0	
		1994	1	10 8	10 8	10 8	0	0				0	0	
		1993	4	0 2	0 2	0 2	0	0				0	0	
		1993	3	0 2	0 2	0 2	0	0				0	0	
		1993	1	0 8	0 8	0 8	0	0				0	0	
		1992	3	0 2	0 2	0 2	0	0				0	0	
		1992	2	1 4	1 4	3 2	0	1 8	0 5	0 5	0 5	0	0	
		1992	1	0 3	0 2	0 2	-0 1	-0 1				0	0	
1386	SAMPLE	1994	2	0	0	0	0	0				0	0	
		1993	4	0 2	0 2	0 2	0	0				0	0	
		1994	1	6 7	6 7	6 7	0	0				0	0	
		1993	3	0 2	0 2	0 2	0	0				0	0	
		1993	2	0 2	0 2	0 2	0	0				0	0	
		1992	3	0 2	0 2	0 4	0	0 2	0 4	0 4	0 4	0	0	
		1992	2	0 4	0 4	0 3	0	-0 1	0 8	0 8	0 8	0	0	
		1992	1	0 3	0 3	0 3	0	0				0	0	
1486	SAMPLE	1994	2	0	0	0	0	0				0	0	
		1994	1	2.4	2.4	2.4	0	0				0	0	
		1993	4	0 2	0 2	0 2	0	0				0	0	
		1993	3	0 4	0 4	0 4	0	0				0	0	
		1993	2	0 4	0 4	0 4	0	0				0	0	
		1992	3	0 2	0 2	0 4	0	0 2	0 1	0 1	0 1	0	0	
		1992	2	0 4	0 4	0 3	0	-0 1				0	0	
		1992	1	0 3	0 2	0 2	-0 1	-0 1				0	0	
1886	WLM	1994	2	0	0	0	0	0				0	0	
		1994	1	5 8	5 9	5 9	0 1	0 1				0	0	No Venting data
		1993	2	0 1	0 1	0 1	0	0				0	0	
		1992	3	0 3	0 3	0 4	0	0 1	0 6	0 6	0 4	0	-0 2	
		1992	2	0 4	0 4	0 4	0	0				0	0	
		1992	1	0 3	0 2	0 2	-0 1	-0 1				0	0	
		1991	4	0 3	0 3	0 3	0	0				0	0	
		1991	3	0 2	0 2	0 2	0	0				0	0	
1986	SAMPLE	1994	2	0	0	0	0	0				0	0	
		1994	1	0	0	0	0	0				0	0	
		1993	4	0 4	0 4	0 4	0	0				0	0	
		1993	2	0 1	0 1	0 1	0	0				0	0	
		1992	3	0 4	0 4	0 4	0	0				0	0	
		1992	2	0 3	0 3	0 3	0	0				0	0	
		1992	1	0 4	0 4	0 4	0	0				0	0	
		1991	4	0 4	0 4	0 9	0	0 5	0 2	0 2	0 2	0	0	
2486	SAMPLE	1994	2	0	0	0	0	0				0	0	
		1994	1	0 5	0 5	0 5	0	0				0	0	
		1993	3	0 3	0 3	0 3	0	0				0	0	
		1993	2	0 4	0 4	0 4	0	0				0	0	
		1992	3	0 3	0 3	0 3	0	0				0	0	
		1992	2	0 3	0 3	0 3	0	0				0	0	
		1992	1	0 2	0 2	0 2	0	0				0	0	
		1991	4	0 4	0 4	0 8	0	0 4	0	0	0	0	0	
3686	SAMPLE	1994	2	0	0	0	0	0				0	0	
		1994	1	5 5	5 6	5 7	0 1	0 2				0	0	No venting data
		1993	3	0 1	0 1	0 1	0	0				0	0	
		1993	2	0 4	0 4	0 4	0	0				0	0	
		1993	1	0 6	0 6	0 6	0	0				0	0	
		1992	3	0 2	0 2	0 2	0	0				0	0	
		1992	2	0 4	0 4	0 4	0	0				0	0	
		1992	1	0 2	0 2	0 2	0	0				0	0	
3886	SAMPLE	1994	2	0	0	0	0	0				0	0	
		1994	1	5 9	6	6 2	0 1	0 3				0	0	No venting data
		1993	4	0 2	0 2	0 2	0	0				0	0	
		1993	3	0 1	0 1	0 1	0	0				0	0	
		1993	2	0 4	0 4	0 4	0	0				0	0	
		1993	1	0 4	0 4	0 4	0	0				0	0	
		1992	3	0 2	0 2	0 2	0	0				0	0	
		1992	2	0 4	0 4	0 4	0	0				0	0	
5486	WLM	1994	2	0	0	0	0	0				0	0	
		1993	2	0 4	0 4	0 4	0	0				0	0	
		1992	3	1 6	1 6	1 8	0	0 2	0 4	0 4	0 4	0	0	
		1992	2	0 8	0 8	0 8	0	0				0	0	
		1992	1	0 2	0 2	0 2	0	0				0	0	
		1991	4	0 2	0 2	0 4	0	0 2	0	0	0	0	0	
		1991	3	0 2	0 2	0 2	0	0				0	0	
		1991	2	0 4	0 4	0 4	0	0				0	0	

TABLE E-3
ROCKY FLATS GROUNDWATER WELLS WITH POSITIVE PID READINGS

Well ID	Status	Year	Qtr	At Opening					After Venting					COMMENTS
				BG	BZ	WH	BZ Diff	WH Diff	BG	BZ	WH	BZ Diff	WH Diff	
3587	WLM	1994	2	0	0	0	0	0				0	0	
		1994	1	11 2	11 2	11 2	0	0				0	0	
		1992	3	0 2	0 2	0 1	0	-0 1				0	0	
		1992	2	0 2	0 2	19 5	0	19 3				0	0	No venting data
		1992	1	0 2	0 2	0 2	0	0				0	0	
		1991	4	0 3	0 3	0 3	0	0				0	0	
		1991	3	0 1	0 1	0 1	0	0				0	0	
		1991	2	0 3	0 3	5 3	0	5				0	0	No venting data
3687BR	SAMPLE	1994	2	0	0	0	0	0				0	0	
		1994	1	2 5	2.5	2 5	0	0				0	0	
		1993	4	0 2	0 2	0 2	0	0				0	0	
		1993	3	0 4	0 4	0 4	0	0				0	0	
		1993	2	0 1	0 1	0 1	0	0				0	0	
		1993	1	0 5	0 5	0 5	0	0				0	0	
		1992	3	0 3	0 3	0 3	0	0				0	0	
		1992	2	0 2	0 2	2 4	0	2 2				0	0	No venting data
4387	WLM	1994	2	0	0	0	0	0				0	0	
		1993	2	0 2	0 2	0 2	0	0				0	0	
		1992	1	0 1	0 1	0 1	0	0				0	0	
		1992	3	0 4	0 4	0 4	0	0				0	0	
		1992	2	0 5	0 5	250	0	249 5				0	0	No venting data
		1991	4	0 2	0 2	0 2	0	0				0	0	
		1991	3	0 3	0 3	0 3	0	0				0	0	
		1991	2	0 4	0 4	0 8	0	0 4	0 2	0 2	0 2	0	0	
4487	WLM	1994	2	0	0	0	0	0				0	0	
		1994	1	5 5	5 5	5 5	0	0				0	0	
		1992	3	0 2	0 2	0 2	0	0				0	0	
		1992	2	4	4	17	0	13	0 6	0 6	0 6	0	0	
		1992	1	0 2	0 2	0 2	0	0				0	0	
		1991	4	0 2	0 2	0 2	0	0				0	0	
		1991	3	0 1	0 1	0 1	0	0				0	0	
		1991	2	0 4	0 4	0 4	0	0				0	0	
4587BR	SAMPLE	1994	2	0	0	0	0	0				0	0	
		1994	1	2 8	2 8	2 8	0	0				0	0	
		1993	3	0 3	0 3	0 3	0	0				0	0	
		1993	2	0 2	0 2	0 2	0	0				0	0	
		1993	1	0 6	0 6	0 6	0	0				0	0	
		1992	3	0 3	0 3	0 3	0	0				0	0	
		1992	2	4	4	4 5	0	0 5	0 2	0 2	0 2	0	0	
		1992	1	0 2	0 2	0 2	0	0				0	0	
5087	WLM	1994	2	0	0	0	0	0				0	0	
		1994	1	5 2	5 2	5 2	0	0				0	0	
		1992	3	0 3	0 3	0 3	0	0				0	0	
		1992	2	4	4	4 5	0	0 5				0	0	No venting data
		1992	1	0 1	0 1	0 1	0	0				0	0	
		1991	4	0 2	0 2	0 2	0	0				0	0	
		1991	3	0 1	0 2	0 2	0 1	0 1				0	0	No venting data
		1991	2	2 4	2.4	2 4	0	0				0	0	
5187	SAMPLE	1994	2	0	0	0	0	0				0	0	
		1994	1	3 6	3 6	3 6	0	0				0	0	
		1993	1	0 7	0 7	1	0	0 3	0	0	0	0	0	
		1992	3	0 4	0 4	0 4	0	0				0	0	
		1992	2	0 3	0 3	0 3	0	0				0	0	
		1992	1	0 1	0 1	0 1	0	0				0	0	
		1991	4	0 2	0 2	0 2	0	0				0	0	
		1991	3	0 2	0 2	0 2	0	0				0	0	
5487	SAMPLE	1994	2	0	0	0	0	0				0	0	
		1994	1	1 2	1 2	1 2	0	0				0	0	
		1993	3	0 1	0 1	0 1	0	0				0	0	
		1993	2	0 6	0 6	17	0	16 4	0 4	0 4	10	0	9 6	2nd day
		1991	2	0 2	0 2	0 2	0	0				0	0	
		1992	3	0 3	0 3	0 2	0	-0 1				0	0	
		1992	2	0 4	0 4	0 3	0	-0 1				0	0	
		1992	1	0 1	0 1	0 1	0	0				0	0	
5587	SAMPLE	1994	2	0	0	0	0	0				0	0	
		1994	1	5 6	5 6	5 6	0	0				0	0	
		1993	3	0 02	0 02	1	0	0 98	0	0	0	0	0	
		1993	2	0 3	0 3	0 3	0	0				0	0	
		1992	3	0 3	0 3	0 2	0	-0 1				0	0	
		1992	2	0 3	0 3	0 3	0	0				0	0	
		1992	1	0 1	0 1	0 1	0	0				0	0	
		1991	4	0 1	0 1	0 1	0	0				0	0	
5887	SAMPLE	1994	2	0	0	0	0	0				0	0	
		1994	1	0 3	0 3	0 3	0	0				0	0	
		1993	4	0 3	0 3	0 4	0	0 1	0 5	0 5	0 5	0	0	1% LEL
		1993	3	0 2	0 2	0 2	0	0				0	0	
		1993	2	0 3	0 3	0 3	0	0				0	0	
		1993	1	0 2	0 2	0 2	0	0				0	0	
		1992	3	0 2	0 2	0 2	0	0				0	0	
		1992	2	0 4	0 4	0 4	0	0				0	0	

TABLE E-3
ROCKY FLATS GROUNDWATER WELLS WITH POSITIVE PID READINGS

Well ID	Status	Year	Qtr	At Opening					After Venting					COMMENTS
				BG	BZ	WH	BZ Diff	WH Diff	BG	BZ	WH	BZ Diff	WH Diff	
B203489	WLM	1994	2	0	0	0	0	0				0	0	
		1993	2	0 3	0 3	0 3	0	0				0	0	
		1993	1	0 2	0 2	0 7	0	0 5	0 2	0 2	0 2	0	0	
		1992	3	2	2	2	0	0				0	0	
		1992	2	0 4	0 4	0 4	0	0				0	0	
		1992	1	0 4	0 4	0 4	0	0				0	0	
		1991	4	0 3	0 3	0 3	0	0				0	0	
		1991	3	0 2	0 2	0 2	0	0				0	0	
B203589	WLM	1994	2	0	0	0	0	0				0	0	
		1993	2	0 6	0 6	0 6	0	0				0	0	
		1993	1	0 2	0 2	0 2	0	0				0	0	
		1992	3	1 8	1 8	1 8	0	0				0	0	
		1992	2	1 7	1 7	150 2	0	148 5	0 2	0 2	0 2	0	0	
		1992	1	0 4	0 4	0 4	0	0				0	0	
		1991	4	0 3	0 3	0 3	0	0				0	0	
		1991	3	0 4	0 4	0 4	0	0				0	0	
B203889	WLM	1994	2	0	0	0	0	0				0	0	
		1993	2	0 6	0 6	0 6	0	0				0	0	
		1993	1	0 2	0 2	0 2	0	0				0	0	
		1992	3	1 8	1 8	1 8	0	0				0	0	
		1992	2	1 7	1 7	2.1	0	0 4	0 3	0 3	0 3	0	0	
		1992	1	0 2	0 2	0 2	0	0				0	0	
		1991	4	0 3	0 3	0 3	0	0				0	0	
		1991	3	0 2	0 2	0 2	0	0				0	0	
B203989	WLM	1994	2	0	0	0	0	0				0	0	
		1994	1	0	0	0	0	0				0	0	
		1993	1	0 4	0 4	0 4	0	0				0	0	
		1992	3	1 9	1 9	1 9	0	0				0	0	
		1992	2	0 15	1 5	2	1 35	1 85	0 3	0 3	0 3	0	0	
		1992	1	0	0	0	0	0				0	0	
		1991	4	0 2	0 4	0 4	0 2	0 2				0	0	No venting data
		1991	3	0 2	0 2	0 2	0	0				0	0	
B204089	WLM	1994	2	0	0	0	0	0				0	0	
		1994	1	6 8	6 8	6 8	0	0				0	0	
		1993	1	0 3	0 3	0 3	0	0				0	0	
		1992	3	0 5	0 5	0 5	0	0				0	0	
		1992	2	1	1	1 2	0	0 2	0 4	0 4	0 4	0	0	
		1992	1	4	4	4 8	0	0 8	0 3	0 3	0 3	0	0	
		1991	4	0 3	0 3	0 3	0	0				0	0	
		1991	3	0 2	0 2	0 4	0	0 2				0	0	
B204189	WLM	1994	2	0	0	0	0	0				0	0	
		1994	1	8	8	8	0	0				0	0	
		1993	1	0 5	0 5	0 5	0	0				0	0	
		1992	3	0 5	0 5	0 5	0	0				0	0	
		1992	2	1	1 2	0 8	0 2	-0 2	0 4	0 4	0 4	0	0	
		1992	1	4	4	5	0	1	0 3	0 3	0 3	0	0	
		1991	4	0 3	0 3	0 3	0	0				0	0	
		1991	3	0 2	0 2	0 2	0	0				0	0	
B405289	WLM	1994	2	0	0	0	0	0				0	0	
		1993	2	0 2	0 2	0 2	0	0				0	0	
		1993	1	0 2	0 2	0 2	0	0				0	0	
		1992	3	3 4	3 4	3 6	0	0 2	0 2	0 2	0 2	0	0	
		1992	2	0 7	0 7	0 6	0	-0 1				0	0	
		1992	1	0 4	0 4	0 4	0	0				0	0	
		1991	4	0 1	0 1	0 1	0	0				0	0	
		1991	3	0 2	0 2	0 2	0	0				0	0	
B405489	WLM	1994	2	0	0	0	0	0				0	0	
		1993	2	0 3	0 3	0 3	0	0				0	0	
		1993	1	0 2	0 2	0 2	0	0				0	0	
		1992	3	2.6	3	4 2	0 4	1 6	0 2	0 2	0 2	0	0	
		1992	2	0 3	0 3	0 3	0	0				0	0	
		1992	1	0	0	0	0	0				0	0	
		1991	4	0 2	0 2	0 2	0	0				0	0	
		1991	3	0 1	0 1	0 1	0	0				0	0	
B405689	WLM	1994	2	0	0	0	0	0				0	0	
		1993	2	0 3	0 3	0 3	0	0				0	0	
		1993	1	0 8	0 8	0 8	0	0				0	0	
		1992	3	2.2	2.2	2.8	0	0 6	0 2	0 1	0 1	-0 1	-0 1	
		1992	2	1 2	1 2	0 8	0	-0 4				0	0	
		1992	1	0	0	0	0	0				0	0	
		1991	4	0 2	0 1	0 1	-0 1	-0 1				0	0	
		1991	3	0 2	0 2	0 2	0	0				0	0	
B405989	WLM	1994	2	0	0	0	0	0				0	0	
		1993	1	0 2	0 2	0 2	0	0				0	0	
		1992	3	1 8	1 8	1 8	0	0				0	0	
		1992	2	0 7	0 7	0 5	0	-0 2				0	0	
		1992	1	0 4	0 4	0 4	0	0				0	0	
		1991	4	0 1	0 2	0 1	0 1	0	0 3	0 2	0 2	-0 1	-0 1	
		1991	3	0 2	0 2	0 2	0	0				0	0	
		1991	2	0 3	0 3	0 3	0	0				0	0	

TABLE E-3
ROCKY FLATS GROUNDWATER WELLS WITH POSITIVE PID READINGS

Well ID	Status	Year	Qtr	At Opening					After Venting					COMMENTS
				BG	BZ	WH	BZ Diff	WH Diff	BG	BZ	WH	BZ Diff	WH Diff	
P210189	SAMPLE	1994	2	0	0	0	0	0				0	0	
		1994	1	0 04	0 04	0 04	0	0				0	0	
		1993	4	0 5	0 5	0 04	0	-0 46				0	0	
		1993	3	0 3	0 3	0 3	0	0				0	0	
		1993	2	0 6	0 6	4	0	3 4	0 5	0 5	1	0	0 5	
		1993	1	0 4	0 4	1	0	0 6				0	0	
		1992	3	0 3	0 3	0 3	0	0				0	0	
		1992	2	0 3	0 3	0 5	0	0 2				0	0	No venting data
B410589	SAMPLE	1994	2	0	0	0	0	0				0	0	
		1992	3	0 4	0 4	0 4	0	0				0	0	
		1992	2	0 7	0 7	1	0	0 3	0 3	0 3	0 3	0	0	
		1992	1	0 3	0 3	0 3	0	0				0	0	
		1991	4	0 2	0 2	0 2	0	0				0	0	
		1991	3	0 2	0 2	0 2	0	0				0	0	
		1991	2	0 4	0 4	0 4	0	0				0	0	
		1991	1	0 2	0 2	0 2	0	0				0	0	
B410689	SAMPLE	1994	2	0	0	0	0	0				0	0	
		1992	3	0 4	0 4	0 4	0	0				0	0	
		1992	2	0 8	0 8	0 7	0	-0 1				0	0	
		1992	1	0 3	0 3	0 3	0	0				0	0	
		1991	4	0 3	0 3	0 3	0	0				0	0	
		1991	3	0 2	0 2	0 3	0	0 1	0 2	0 2	0 2	0	0	
		1991	2	0 3	0 4	0 4	0 1	0 1	0 4	0 4	0 4	0	0	
		1991	1	0	0	0	0	0				0	0	
B213789	SAMPLE	1994	2	0	0	0	0	0				0	0	
		1994	1	5 5	5 6	5 8	0 1	0 3				0	0	no venting data
		1993	4	0 4	0.4	0 4	0	0				0	0	
		1992	3	0	0	0	0	0				0	0	
		1992	2	0 4	0 4	0 4	0	0				0	0	
B315289	WLM	1994	2	0	0	0 1	0	0 1				0	0	No venting data
P115589	SAMPLE	1994	2	0	0	2.1	0	2 1	0	0	0	0	0	
		1994	1	3	3	3	0	0				0	0	
		1993	4	0 8	0 8	0 8	0	0				0	0	
		1992	3	0 3	0 3	0 3	0	0				0	0	
		1992	2	0 4	0 4	0 5	0	0 1				0	0	No venting data
P115689	SAMPLE	1994	2	0	0	0	0	0				0	0	
		1994	1	2	2	4 9	0	2 9	0 7	0 7		0	-0 7	
		1993	4	0 6	0 6	0 6	0	0				0	0	
		1992	3	0 4	0 4	0 4	0	0				0	0	
		1992	2	0 5	0 5	0 5	0	0				0	0	
P416889	SAMPLE	1994	2	0	0	0	0	0				0	0	
		1994	1	0 33	0 33	0 35	0	0 02	2 8	2 8	2 8	0	0	
		1993	4	0 6	0 6	0 6	0	0				0	0	
		1992	3	0 3	0 3	0 3	0	0				0	0	
		1992	2	0 4	0 4	0 4	0	0				0	0	
B218789	WLM	1994	2	0	0	0	0	0				0	0	
		1992	3	0 1	0 1	0 1	0	0				0	0	
		1992	2	0 3	0 3	0 3	0	0				0	0	
		1992	1	0 3	0 3	0 3	0	0				0	0	
		1991	4	0 2	0 2	0 2	0	0				0	0	
		1991	3	0 1	0 1	0 1	0	0				0	0	
		1991	2	0 4	0 4	2.2	0	1 8	0 4	0 4	0 6	0	0 2	
		1993	2	0 3	0 3	0 3	0	0				0	0	
		1992	3	0 3	0 3	0 3	0	0				0	0	
		1992	2	5 2	5 2	5 8	0	0 6	0 8	0 8	0 8	0	0	
00191	SAMPLE	1994	2	0	0	0	0	0				0	0	
		1994	1	1 2	1 2	1 2	0	0				0	0	
		1993	4	0 2	0 2	0 2	0	0				0	0	
		1993	3	0	0 02	0 02	0 02	0 02				0	0	No venting data
		1993	2	0 4	0 4	0 4	0	0				0	0	
		1993	1	0 5	0 5	1	0	0 5				0	0	
		1992	3	0 3	0 3	0 3	0	0				0	0	
		1992	2	0 4	0 4	0 4	0	0				0	0	
00391	SAMPLE	1994	2	0	0	0	0	0				0	0	
		1994	1	0 2	0 2	0 2	0	0				0	0	
		1993	3	0 1	0 1	0 1	0	0				0	0	
		1993	2	0 2	0 2	0 2	0	0				0	0	
		1993	1	0 4	0 4	1	0	0 6				0	0	No venting data
		1993	4	0 2	0 2	0 2	0	0				0	0	
		1992	3	0 3	0 3	0 3	0	0				0	0	
		1992	2	0 2	0 2	0 4	0	0 2				0	0	No venting data
00691	SAMPLE	1994	2	0	0	0	0	0				0	0	
		1994	1	6	6	6	0	0				0	0	
		1993	4	0 2	0 2	0 2	0	0				0	0	
		1992	3	0 6	0 6	0 6	0	0				0	0	
		1992	2	4 8	4 8	5 4	0	0 6				0	0	No venting data
00791	WLM	1994	2	0	0	0	0	0				0	0	
		1992	3	0 4	0 4	0 4	0	0				0	0	
		1992	2	5 2	5 2	6	0	0 8	0 2	0 2	0 2	0	0	
00991	WLM	1994	2	0	0	0	0	0				0	0	
		1992	3	0 4	0 4	0 4	0	0				0	0	
		1992	2	4	4	9	0	5				0	0	No venting data
		1992	1	8	8	20	0	12				0	0	No venting data

TABLE E-3
ROCKY FLATS GROUNDWATER WELLS WITH POSITIVE PID READINGS

Well ID	Status	Year	Qtr	At Opening					After Venting					COMMENTS
				BG	BZ	WH	BZ Diff	WH Diff	BG	BZ	WH	BZ Diff	WH Diff	
02991	SAMPLE	1994	2	0	0	0	0	0				0	0	
		1994	1	0 2	0 2	0 2	0	0				0	0	
		1993	4	0 2	0 2	0 2	0	0				0	0	
		1993	3	0 3	0 3	0 3	0	0				0	0	
		1993	2	0 6	0 6	0 6	0	0				0	0	
		1992	3	0 2	0 2	0 2	0	0				0	0	
		1992	2	0 2	0 2	0 2	0	0				0	0	
		1992	1	3 8	4 8	4 8	1	1	1 6	1 6	1 6	0	0	
03091	SAMPLE	1994	2	0	0	0	0	0				0	0	
		1994	1	1	1	1	0	0				0	0	
		1993	4	2 2	2 2	3	0	0 8				0	0	No venting data
		1993	3	0 3	0 3	0 3	0	0				0	0	
		1993	2	0 2	0 2	0 2	0	0				0	0	
		1993	1	0 6	0 6	0 6	0	0				0	0	
		1992	3	0 3	0 3	0 3	0	0				0	0	
		1992	2	0 2	0 2	0 2	0	0				0	0	
03191	WLM	1994	2	0	0	0	0	0				0	0	
		1994	1	1 1 5	1 1 5	1 1 5	0	0				0	0	
		1993	4	0 3	0 3	0 3	0	0				0	0	
		1992	3	1 5	1 5	1 5	0	0				0	0	
		1992	2	0 2	0 2	0 2	0	0				0	0	
		1992	1	8 6	8 6	1 0 2	0	1 6	0	0	0 2	0	0 2	
		1991	4	1 2	1 2	1 2	0	0				0	0	
03591	SAMPLE	1994	2	0	0	0	0	0				0	0	
		1994	1	0 2	0 2	0 2	0	0				0	0	
		1993	4	0 6	0 6	0 6	0	0				0	0	
		1993	3	0 3	0 3	0 3	0	0				0	0	
		1993	1	0 6	0 6	0 6	0	0				0	0	
		1992	3	0 1	0 1	0 1	0	0				0	0	
		1992	2	0 2	0 2	0 2	0	0				0	0	
		1992	1	7 2	7 2	8 4	0	1 2	0 2	0 2	0 2	0	0	Day 4
03691	SAMPLE	1994	2	0	0	0	0	0				0	0	
		1994	1	0 8	0 8	3 5	0	2 7				0	0	No venting data
		1993	4	0 4	0 4	0 4	0	0				0	0	
		1993	3	0 2	0 2	0 2	0	0				0	0	
		1993	2	0 4	0 4	0 4	0	0				0	0	
		1993	1	0 7	0 7	6	0	5 3				0	0	
		1992	3	0 4	0 4	0 4	0	0				0	0	
		1992	2	0 2	0 2	0 2	0	0				0	0	
04091	SAMPLE	1994	2	0	0	0	0	0				0	0	
		1994	1	2 8	2 8	2 8	0	0				0	0	
		1993	4	0 2	0 2	0 2	0	0				0	0	
		1993	3	0 2	0 2	0 2	0	0				0	0	
		1993	2	0 4	0 4	0 4	0	0				0	0	
		1993	1	0 6	0 6	0 6	0	0				0	0	
		1992	3	0 6	0 6	0 6	0	0				0	0	
		1992	2	4	4	5	0	1	4 8	5	5 4	0 2	0 6	Day 2
04291	SAMPLE	1994	2	0	0	0	0	0				0	0	
		1994	1	0 8	0 8	0 8	0	0				0	0	
		1993	4	0 3	0 3	0 3	0	0				0	0	
		1993	2	0 2	0 2	0 2	0	0				0	0	
		1992	3	0 3	0 3	0 4	0	0 1	0 4	0 4	0 4	0	0	
		1992	2	0 4	0 4	0 4	0	0				0	0	
		1992	1	4 8	4 8	6 2	0	1 4				0	0	No venting data
04491	SAMPLE	1994	2	0	0	0	0	0				0	0	
		1994	1	0 8	0 8	0 8	0	0				0	0	
		1993	4	0 2	0 2	0 2	0	0				0	0	
		1993	2	0 0 3	0 0 3	0 0 3	0	0				0	0	
		1992	3	0 9	0 9	0 4	0	-0 5				0	0	
		1992	2	0 4	0 4	0 6	0	0 2	0 2	0 2	0 2	0	0	
		1992	1	7 8	7 8	8	0	0 2				0	0	No venting data
04891	WLM	1994	2	0	0	0	0	0				0	0	
		1993	2	0 2	0 2	0 2	0	0				0	0	
		1992	3	0 4	0 4	0 4	0	0				0	0	
		1992	2	0 3	0 3	0 3	0	0				0	0	
		1992	1	2	2	2 2	0	0 2	1	1	1	0	0	
		1991	4	0	0	0	0	0				0	0	
04991	SAMPLE	1994	2	0	0	0	0	0				0	0	
		1994	1	0 1	0 1	0 1	0	0				0	0	
		1993	4	0 2	0 2	0 2	0	0				0	0	
		1993	3	0 2	0 2	0 2	0	0				0	0	
		1993	1	0 6	0 6	0 6	0	0				0	0	
		1992	3	0 4	0 4	0 4	0	0				0	0	
		1992	2	0 4	0 4	0 4	0	0				0	0	
		1992	1	4 6	4 6	5	0	0 4	2	2	2	0	0	
05091	SAMPLE	1994	2	0	0	0	0	0				0	0	
		1994	1	0 2	0 2	0 2	0	0				0	0	
		1993	4	0 2	0 2	0 2	0	0				0	0	
		1993	3	0 2	0 2	0 2	0	0				0	0	
		1993	1	0 6	0 6	0 6	0	0				0	0	
		1992	3	0 4	0 4	0 4	0	0				0	0	
		1992	2	0 5	0 5	0 5	0	0				0	0	
		1992	1	0 3	0 9	0 5	0 6	0 2	0 5	0 5	0 5	0	0	

GROUNDWATER MONITORING PROGRAM SUBCONTRACTOR
SPECIAL TASK
HEALTH AND SAFETY PLAN
Revision Level___
Job No.

1. Items 1-9 to be completed by EG&G Special Task Project Manager.

Project Name _____

Task _____

Requested by _____

Proposed Start-Up Date _____ 19 Project/Task No. _____

Rev Level _____

Prepared by/Reviewed by Groundwater Monitoring Program Subcontractor
Health and Safety Officer

Printed Name _____

Signature _____ Date _____ 19

Reviewed by Groundwater Monitoring Subcontractor Site Safety Officer

Printed Name _____

Signature _____ Date _____ 19

Approved by EG&G Special Task Project Manager

Printed Name _____

Signature _____ Date _____ 19

Title _____

Note to Project Managers

A signed and completed copy of the Health and Safety Plan and a signed and completed copy of the safety briefing (p 14) must be included in the project file

2. Project Description:

3. Location:

4. Facility/Work Site Description:

5. Proposed Personnel and Tasks:

Project Manager _____

Field Team Leader _____

Proposed Field Team	Job Function/Tasks

6. **Confined Space Entry**

A confined space is defined as any space not currently used or intended for human occupancy, having a limited means of egress, which is subject to the accumulation of toxic contaminants, a flammable or oxygen deficient atmosphere, or other hazards, such as engulfment, or electrical or mechanical hazards should equipment be inadvertently activated while an employee is in the space Confined spaces include but are not limited to storage tanks, process vessels, bins, boilers, ventilation or exhaust ducts, air pollution control devices, smoke stacks, underground utility vaults, sewers, septic tanks, and open top spaces more than four feet in depth such as test pits, waste disposal trenches, sumps and vats.

Will this task require entry into any confined or partially confined space? ___ YES - Describe below ___ No

7. **Cutting and Welding**

Will this task involve use of a cutting torch or welding? ___ YES - Describe below ___ No

8. **Other Potential Hazards**

___ Chemical
___ Radiological
___ Fire/Explosion
___ Heat Stress
___ Electrical
___ Machinery/Mechanical Equipment
___ Trips, Slips, Falls
___ Trenching/Shoring
___ Heavy Equipment/Vehicular Traffic
___ Overhead Hazards
___ Unstable/Uneven Terrain
___ Other - Describe below

6,7,8 **Description/Other**

9 I, _____, attest that this information is accurate to the best of my knowledge and hereby request a Health and Safety Plan for the task(s) designated above

_____
Signature Date

_____
Title

10. Chemical/Radiological Hazard Evaluation

Waste Media

___ Airborne Contamination
___ Surface Contamination
___ Contaminated Soil
___ Contaminated Groundwater
___ Contaminated Surface Water
___ Solid Waste
___ Liquid Waste
___ Sludge

Hazardous Characteristics

___ Ignitible
___ Corrosive
___ Reactive
___ Explosive
___ Toxic (non-radiological)
___ Radioactive

Substance

This task will involve the reasonable possibility of exposure to the substances listed below at concentrations or in quantities which may be hazardous to the health of the site personnel.

Primary Hazard (Rate: low, med, high, ext)

Substance	Inhalation of Gases/ Vapors	Inhalation of Dusts/ Mists	Ingestion	Dermal Absorption of Solids/ Liquids and/or Skin Contam.	Dermal Absorption of Gases/ Vapors	Corrosive/ Irritant	Ignit-ability	Reactivity/ Explosion

Substance	Exposure Limit	IDLH Level	Health Effects

11. Ambient Air/Site Monitoring Procedures

The following instruments shall be used to monitor the work environment and workers' breathing zones prior to site entry and at the specified intervals

Instrument	Monitoring Frequency				
_____ PID (HNU, OVM) w/_____eV lamp	Cont	15min	30min	hourly	other _____
_____ OVA	Cont	15min	30min.	hourly	other _____
_____ Combustible Gas Indicator	Cont.	15min	30min	hourly	other _____
_____ H2S Detector	Cont.	15min	30min.	hourly	other _____
_____ Colorimetric Detector Tubes	Cont.	15min.	30min.	hourly	other _____
_____ Other (describe below)	Cont	15min	30min.	hourly	other _____

Description/Other·

12. Action Levels

Task personnel shall observe the following Action Levels

Instrument	Action Level	Specific Action

13. Personal Monitoring

___ Passive Dosimeter ___ Personal Air Sampling ___ Other

Description/Other:

14. Biological Monitoring/Medical Surveillance

____ This project requires medical surveillance or biological monitoring procedures beyond the provisions of the routine medical surveillance program, see description below

Description:

15. Onsite Control

Control boundaries have been established, and the Exclusion Zone (the contaminated area), Hotline, Decontamination Line, Contamination Control Zone and Support Zone (clean area) have been designated and are identified as follows

(Name)_____ has been designated to coordinate access control on the work site during this task No unauthorized person shall be allowed beyond the Contamination Control line

16. Personal Protective Equipment

Location	Job Function/Task	Initial Level of Protection
Controlled Zone	_____	B C D 1 2 3 other
	_____	B C D 1 2 3 other
	_____	B C D 1 2 3 other
	_____	B C D 1 2 3 other
	_____	B C D 1 2 3 other
Decontamination Zone	_____	B C D 1 2 3 other
	_____	B C D 1 2 3 other
	_____	B C D 1 2 3 other

List the specific protective equipment and material (where applicable) for each of the Levels of Protection identified above

Level B _____

___ Pressure demand airline
___ Pressure demand airline with escape provisions
___ Pressure demand SCBA

Level C _____

___ Half face Air Purifying Respirator
___ Full face Air Purifying Respirator
___ Full face canister Air Purifying Respirator
___ Standard work clothes
___ Hard hat, steel toed boots, safety glasses
___ Ear protection during drill rig operation
___ Inner latex gloves
___ Outer NBR (Nitrile Butyl Rubber) gloves

Level _____ _____

___ Standard works clothes
___ Hard hat, steel toed boots, safety glasses
___ Ear protection during drill rig operation
___ Inner latex gloves
___ Outer NBR gloves

Level _____ _____

Where air purifying respirators are authorized, _____ are the appropriate canisters/cartridges for use with the specific substances and concentrations anticipated. Cartridges shall be replaced at the start of each work day

NO CHANGES TO THE SPECIFIED LEVELS OF PROTECTION SHALL BE MADE WITHOUT THE KNOWLEDGE AND APPROVAL OF THE HEALTH AND SAFETY OFFICER AND THE PROJECT MANAGER

17. **Decontamination**

Personnel and equipment leaving the Controlled Zone shall proceed through the following decontamination stations and procedures from the decontamination zone.

Personnel Decontamination

Station	Procedure

Equipment Decontamination

Station	Procedure

The following decontamination equipment is required.

Emergency decontamination procedures.

18. Confined Entry Procedures _____ Not Applicable

Yes	N/A		Yes	N/A	
___	___	Provide Forced Ventilation	___	___	Refer to Personal Protective Equip (#16)
___	___	Test Atmosphere For:	___	___	Refer to Emergency Procedures (#29)
___	___	(a) $\%O_2$	___	___	Other Special Procedures
___	___	(b) %LEL			
___	___	(c) Other			

Descriptions/Other:

19. Cutting/Welding Procedure _____ Not Applicable

Yes	N/A	
___	___	Relocate or Protect Combustibles
___	___	Wet Down or Cover Combustible Floor
___	___	Check Flammable Gas Concentrations (%LEL) in air
___	___	Cover Wall, Floor, Duct and Tank Openings
___	___	Provide Fire Extinguisher

Other Special Instructions

20. Onsite Organization and Coordination

Project Manager: _____

Field Team Leader: _____

Site Safety Officer: _____

Field Team	Name	Job Function

21. Special Instructions

22. **Sanitation Requirements**

Potable water supply available on work site? ___ Yes

Portable toilets required on work site? ___ Yes If Yes, how many? _____
___ No

Temporary washing/shower facilities required at work site? ___ Yes If yes, describe below
___ No If no, state location existing facilities

Description:

23. **Field Procedures Change Authorization**

Instruction Number to be changed

Duration of Authorization Requested
___ Today only
___ Duration of Task

Date _____

Description of Procedures Modification:

Justification:

Person Requesting Change:

Name

Title

Signature

Verbal Authorization Received From:

Name

Title

Time

Approved By
(Signature of person named above to be obtained within 48 hours of verbal authorization)

24. **Emergency Procedures** This page is to be posted at prominent location on site.

Yes ____ No ____ On-site Communications Required? Emergency Channel _____

Nearest Telephone _____

Fire and Explosion

In the event of a fire or explosion, if the situation can be readily controlled with available resources without jeopardizing the health and safety of yourself, the public, or other site personnel, take immediate action to do so, otherwise:

1 Notify emergency personnel by calling _____

2 If possible, isolate the fire to prevent spreading.

3. Evacuate the area

Chemical Exposure

Site workers must notify the site health and safety officer immediately in the event of any injury or any of the signs or symptoms of overexposure to hazardous substances identified below:

Substances Present	Symptoms of Acute Exposure	First Aid

24. Emergency Procedures - Cont'd

On Site Injury Or Illness

In the event of an injury requiring more than minor first aid, or any employee reporting any sign or symptom of exposure to hazardous substances, immediately take the victim to _____ located at _____ _____, phone _____. In the event of life-threatening or traumatic injury, implement appropriate first-aid and immediately call for emergency medical assistance at _____. The nearest designated trauma center is _____ located at _____, phone _____

Designated Personnel Current in First Aid/CPR (Names)

_____	_____
_____	_____
_____	_____
_____	_____

Designated Back-Up Personnel (Names)	Function
_____	_____
_____	_____
_____	_____
_____	_____

Required Emergency Back-Up Equipment

Emergency Response Authority

_____ is the designated site emergency coordinator and has final authority for first response to on-site emergency situations.

Upon arrival of the appropriate emergency response personnel, the site emergency coordinator shall defer all authority but shall remain on the scene if necessary to provide any and all possible assistance At the earliest opportunity, the site safety officer or the site emergency coordinator shall contact the project coordinator or health and safety officer

Project Coordinator _____ Phone (w)_____ (h) _____

Health and Safety Officer _____ Phone (w)_____ (h) _____

25. **Safety Briefing**

The following personnel were present at pre-job safety briefing conducted at _____(time) on_____ ____(date) at_____(location), and have read the above plan and are familiar with its provisions:

Name	Signature

Fully charged ABC Class fire extinguisher available on site? YES ___
Fully stocked First Aid Kit available on site? YES ___
All project personnel advised of location of nearest phone? YES ___
All project personnel advised of location of designated medical facility or facilities? YES ___

_____
Printed Name of Field Team Leader or Site Safety Officer

_____
Signature Date